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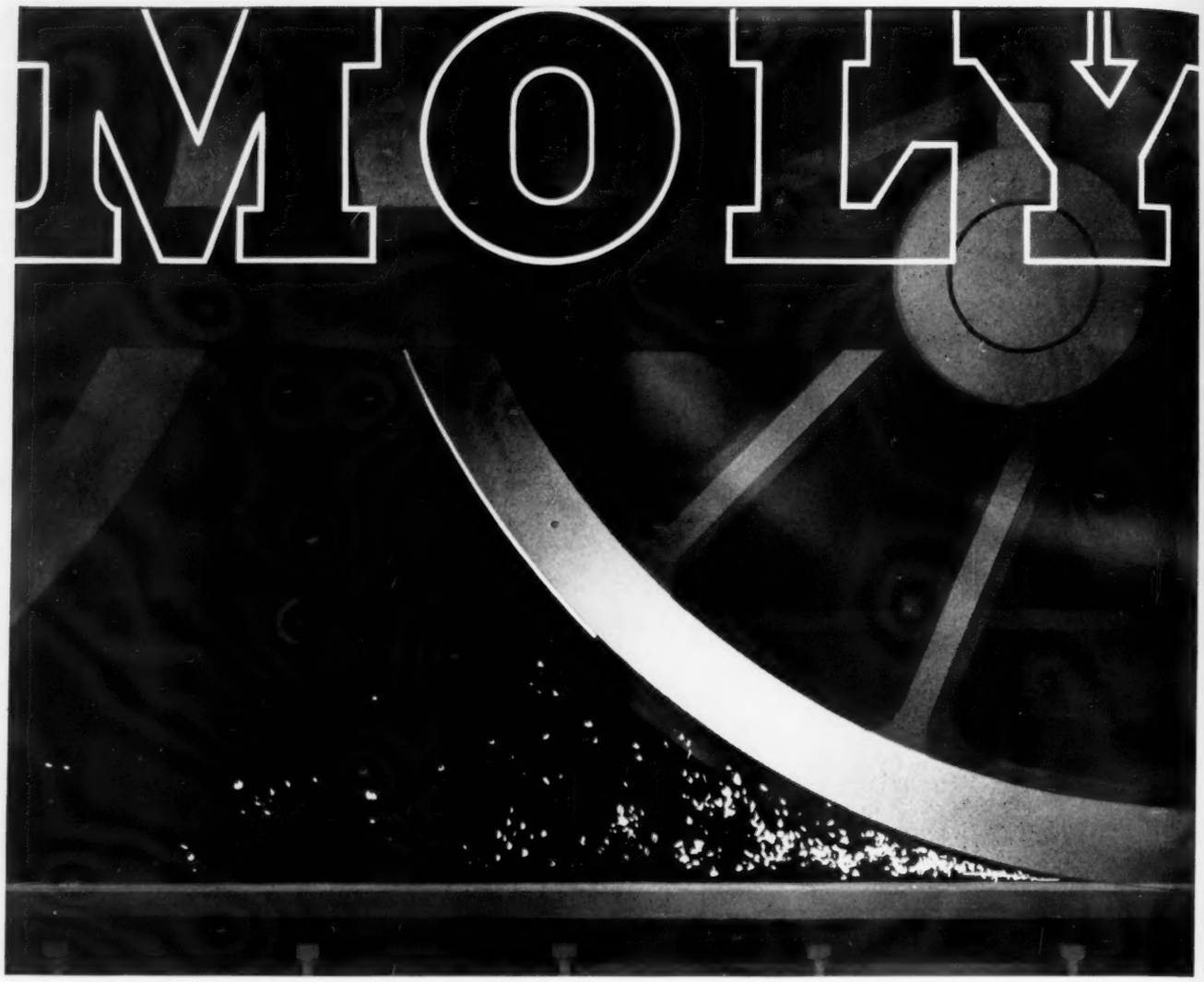


LIKE SAND ON RAILS . . . a little does a lot

WHAT a bit of sand does in increasing the braking efficiency of steel-against-steel, offers something of a parallel to the inherent efficiency steel gains through the addition of a small quantity of Molybdenum. So powerful is this unique alloying element that it stands alone as a metallurgical development. Of the many qualities it improves in steel, creep strength offers an example. Note the following comparison, with and without small "Moly" additions:

	C	Mn	Mo	Creep strength at 1000°F. (.01% elongation in 1000 hrs.)
Low Carbon Steel	.15%	.45%	nil	3200
Molybdenum Steel	.15	.45	.50	9200

Molybdenum is being utilized more and more in a wide variety of applications where retention of strength at high temperatures is an important factor. And its cost, in relation to the results obtained, is invariably outweighed by longer life and increased efficiency.

May we keep you up to date on Molybdenum progress? Ask to be put on the mailing list for our new periodical house organ, "*The Moly Matrix.*" Write also for these interesting new books: "*Molybdenum in* 1934" and "*Molybdenum in Cast Iron* — 1934 *Supplement.*" Feel free to enlist the services of our metallurgists and experimental laboratory (located at Detroit) toward the solving of any alloy problems you may have. Climax Molybdenum Company, 500 Fifth Ave., New York City.

In Canada—Railway & Power Engineering Corporation, Ltd., Montreal

CLIMAX Mo-lyb-den-um

As Editor the Views the News

UNMISTAKABLE evidence of marked business improvement along a broad front punctuates the news of the week. Highlights in one of the most encouraging market summaries STEEL has been privileged to present since the beginning of the depression include (p. 57) a 3½ point rise in steelworks operations, expanding specifications from automobile builders, a spurt in railroad purchases, continued strength in scrap, and an imminent wave of awards of steel mill equipment. Programs involving steelworks and rolling mill equipment now under way or contemplated (p. 14) aggregate $100,000,000. The more favorable outlook is supported by current weekly statistics (p. 22), which show the pace of industrial activity has quickened noticeably.

• • •

Readers of General Dawes' address of last Wednesday will be attracted by his prediction that "June or July of 1935 should be the beginning of a great, sustained demand for durable goods." They should not overlook the reasoning behind this spectacular forecast; it is quite as significant as the prediction itself. For instance, consider his point that the "normal course of recovery involving mass action is not determined by human reasoning but by human nature" (p. 13) and that the rate of recovery is following the same course in this present depression and for the same simple causes that it did in two former major depressions.

What Causes Recovery?

• • •

These ideas are not new. That the patterns of all major depressions are almost identical is well known. The importance of human nature, while not emphasized much in recent years, is widely recognized. It is the timeliness of the general's utterances, rather than their novelty, which commends them to special attention. At a time when a much publicized "planned economy" has been proved ineffective and when the nation is returning to fundamentals in revamping its recovery program, General Dawes' reminder that depressions run in grooves carved by human nature sounds discouragingly fatalistic. It makes one wonder why nations, companies and individuals consistently refuse to learn from the experience of past lean periods. Does it not suggest that from now on plans of government, corporation and citizen for recovery should be freed as rapidly as possible from artificial influences?

Too Much Artificiality

• • •

In electing Eugene G. Grace to the position of chief executive officer of the American Iron and Steel institute (p. 10), the board of directors conferred a richly deserved honor upon the man who has carried the lion's share of responsibility in the industry's effort to co-ordinate activities under NRA codification. In elevating Tom M. Girdler to the post of vice president, it also accorded merited recognition to one who has shared heavily in the co-operative burdens. The provision that the president shall be elected from within the industry and that the office may be conferred from time to time upon various leaders in the industry will impress the majority of members as logical steps in the plan of reorganization.

Leadership Is Recognized

• • •

Prior to its shipment to India for the Tata Iron & Steel Co., a 3-high mill for roughing sheet bars was exhibited to 150 American sheet mill executives, guests of the four companies which collaborated in its design and construction. The mill, believed to be the fastest ever built for the purpose (p. 24), is designed to roll 1800 pairs in 8 hours. . . . Keenly interested in the stress lines shown in a fractured steam hammer ram, A. E. Gibson conceived the idea of checking them against directional stress lines shown by polarized light in a celluloid sample. His findings (p. 38) lend important, new support to the reliability of polarized light stress distribution as a guide in design. The article should interest all designers of welded equipment.

Fast Mill Goes to India

E. L. Shaner

Grace Becomes President in New Setup of Steel Institute

EUGENE G. GRACE, president of the Bethlehem Steel Corp., on Dec. 13 was elected president of the American Iron and Steel institute by a unanimous vote of its board of directors.

His election was concurrent with a reorganization of the form of the Institute. Hereafter the head of that body shall be a president elected from within the industry and, so that the presidency may be conferred from time to time on various leaders in the industry, no president can serve more than two years.

Also, under this reorganization, the office of chairman of the board is abolished. This marks the passing of Charles M. Schwab, chairman of Bethlehem, from the active counsels of the Institute. When Robert P. Lamont resigned the presidency on Sept. 20, 1933, Mr. Schwab, as chairman, became the chief executive officer. At the May, 1934, meeting Mr. Schwab asked to be relieved of his duties.

To succeed Mr. Grace as vice president of the Institute, Tom M. Girdler, chairman and president of the Republic Steel Corp., Cleveland, was elected. Walter S. Tower continues as executive secretary.

As a member of the executive and administrative committees of the board of directors of the Institute, Mr. Grace has taken a leading part in the direction of the affairs of the Institute and in the administration of the steel code. The board of directors is charged with the responsibility of administering the code.

Fifty-eight years old, a graduate of Lehigh university, Mr. Grace has been with Bethlehem since 1899. The transition from a yard workman to president of the Bethlehem Steel Co. he effected in 14 years. Made president of the Bethlehem company on April 1, 1913, he also became head of the Bethlehem Steel Corp. on Feb. 17, 1916, and also became president of the Bethlehem Shipbuilding Corp. on Oct. 30, 1917.

Steelmaker for 55 Years

It is in his fifty-fifth year in the steel industry that Mr. Schwab relinquishes the highest post of the Institute, which he assumed in 1927 on the death of Judge E. H. Gary. He has been an active member and a director of the Institute since it was organized in 1908. Now nearing 73, he has been in the industry since 1880, starting in the Edgar Thomson works of the Carnegie Steel Co. Over the past few years Mr. Schwab has relinquished practically all of his active business connections.

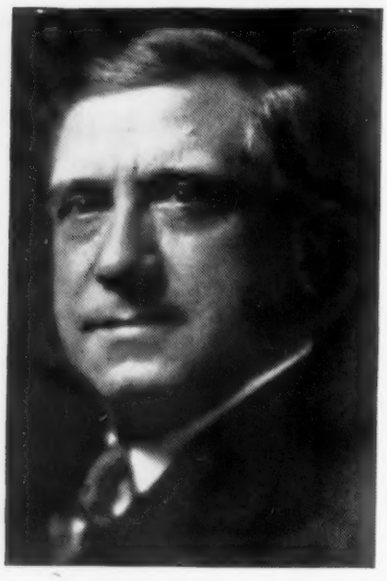
At the meeting of directors Thursday, when he officially stepped down, the board presented Mr. Schwab with a memorial book of appreciation for his long service as chairman. The book contains the embossed resolutions of regret adopted by the directors and signed by each of the 32 members of the board. The presentation was made by George M. Verity, chairman of the American Rolling Mill Co.

In presenting the memorial on behalf of the directors, Mr. Verity said:

"The resolutions were adopted in an attempt to express the appreciation of the board of directors, and through them of the entire industry, for your outstanding contribution to the industry over a long period of years and to further express the regret that in order to conserve your health you felt you could no longer continue in your leadership of the industry.

"The resolutions, which I have the honor to present, are so complete in their expression that there is nothing left to be said except to express the opinion that in all the history of the steel industry there has never been a man who so largely occupies the affections and good will of the industry as you have done."

The complete personnel of the Institute now is: President, Eugene G. Grace; treasurer, William J. Filbert; active vice presidents, William A. Irvin and Tom M. Girdler; honorary vice presidents, Thomas Cantley, Nova Scotia Steel & Coal Co., New Glasgow, N. S.; James A. Farrell, retired president, United States Steel Corp., Willis L. King, director of the Jones & Laughlin Steel Corp., and Horace S. Wilkinson, chairman, Crucible Steel Co. of America; and executive secretary, Walter S. Tower.



Charles M. Schwab

Eugene G. Grace

Tom M. Girdler

Quantity Extras

MILL quantity extras on shapes and plates, on which the suspension was lifted Dec. 1 to become effective on shipments beginning Jan. 1, have again been suspended by the American Iron and Steel institute. This suspension is until March 1, 1935, when the extras become effective on sales for shipment beginning April 1.

These quantity extras on plates appear on page 8, section 4, of the extras handbook; on structurals, page 5, section 6; and on floor plates, page 2, section 5.

The quantity extras on floor plates that were in effect prior to Dec. 1 and were published on page 2A, section 5, remain in effect from and after Dec. 1.

Objection to the extras was registered with the Institute by NRA. In Washington it was said Friday that the steel code provides that extras shall be limited to practices in the trade at the time the code took effect. Complaint against the extras was received by NRA and in making a survey it was found that the extras approved by the Institute were not properly approved.

Financial

SPECIAL meeting of stockholders of the Republic Steel Corp. to consider acquisition of the Corrigan, McKinney Steel Co., Cleveland, and Truscon Steel Co., Youngstown, O., originally scheduled for Oct. 30 and postponed to Dec. 17, has again been postponed to Feb. 5.

According to Tom M. Girdler, chairman, the postponement was necessitated by the rigorous regulations of the securities and exchange control commission. Proxies received to date in support of the mergers and financial reorganization amount to 55 per cent of the preferred and 66 per cent of the outstanding common stock. Affirmative action of at least 66 2/3 per cent of each class is required.

An injunction suit has been filed in New York to restrain Republic from paying to Kuhn, Loeb & Co. and Field, Glore & Co. 50,000 shares of common stock for their services in effecting the mergers, on the ground this compensation is extravagant and wastes the assets of Republic. An outright payment of $500,000 is preferable to handing over 50,000 shares, it is contended in the suit.

UNITED TO PAY EXTRA

United Engineering & Foundry Co., Pittsburgh, listing 416,118 shares of common stock outstanding, will pay out the day before Christmas $208,054 when a special Christmas dividend of 50 cents a share is sent to stockholders. Regarding this disbursement, the common stock went ex-dividend Dec. 14.

This is the first extra from United Engineering since 1931, although common dividends have been paid in the interim. Lacking estimates of the company's complete return for 1934, it is reported that the company covered the $1.50 regular yearly common dividend by earnings of the first ten months of the year and total earnings will probably be the best since 1931, when $2.13 a common share was reported. October is reliably reported to have been the company's best month in four years.

SPANG PAYS $1 ON PREFERRED

Spang, Chalfant & Co. Inc., Pittsburgh, declared two 50-cent dividends on its 6 per cent cumulative preferred stock last week, thereby breaking a dividend void on the preferred from early 1932. The dividends are payable Dec. 31 and Jan. 4, both to Dec. 17 record. Spang-Chalfant, despite losses in 1931, 1932 and 1933, has kept a strong working capital position. At the last statement this amounted to approximately $14,000,000 and the two 50-cent dividends are requiring an outlay of only $129,940.

¶Vanadium-Alloys Steel Co., Pittsburgh, has declared a 25-cent dividend payable Jan. 2 to Dec. 20 record. The last previous payment was 50 cents on Aug. 1.

¶Acme Steel Co., Chicago, has declared an extra dividend of 12½ cents per share on its common stock in addition to the regular quarterly dividend of 37½ cents, both payable Jan. 2 to record of Dec. 20.

Foreign

SECRETARY OF STATE HULL has announced that he is entering into foreign trade agreement negotiations with the Netherlands, including Netherland India, Netherland Guiana and the Netherland West Indian Islands. Oral presentation of views by domestic American firms is to be made on Feb. 4.

The United States exports tin and terne plate to these countries, while this country imports tin. Figures indicate that in 1933 the United States exported 4374 tons of scrap, valued at $112,263, to the Netherlands, while in 1929 208 tons valued at $3,862 were exported.

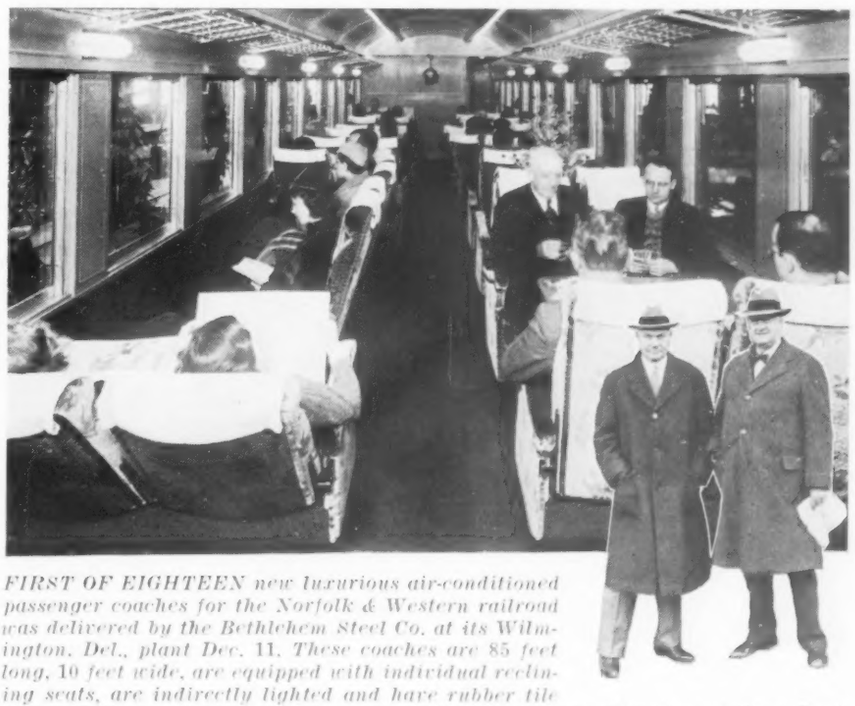
Also in 1933, 1,530,657 pounds of iron and steel plates, sheets, etc., were exported, valued at $39,598, compared with 3,002,366 pounds valued at $144,325 in 1929.

In 1933 the United States imported 68,341 tons of pig iron valued at $701,546 compared with 24,189 tons valued at $435,782 imported in 1929.

Basing Point

REPRESENTATIVES of NRA and the federal trade commission will meet in Washington, Dec. 21, to consider the independent reports of both on the basing point system and other pricing methods contained in the steel code.

Written in response to the order of the President on May 30 in extending the steel code, the trade commission report, already at the White



FIRST OF EIGHTEEN new luxurious air-conditioned passenger coaches for the Norfolk & Western railroad was delivered by the Bethlehem Steel Co. at its Wilmington, Del., plant Dec. 11. These coaches are 85 feet long, 10 feet wide, are equipped with individual reclining seats, are indirectly lighted and have rubber tile floors. Rubber mounted in the trucks reduces noise and vibration. Quincy Bent, vice president of Bethlehem (left), presented the car to Col. W. S. Battle Jr. (right), of Roanoke, Va., a Norfolk & Western vice president

House, is being withdrawn. NRA held back its report pending its efforts to arrange a conference.

The presumption is that the trade commission is hostile to the present basing point system, demanding f.o.b. prices at every mill; the NRA report is understood to be favorable to the present setup.

Since members of the NRA advisory board and the trade commission lack technical knowledge of the iron and steel industry it is expected that conferees will include William Kelly, chief counsel, Francis Walker, chief economist, and Hugh E. White, economist, for the trade commission, and Deputy Administrator R. W. Shannon and Blackwell Smith, acting chief counsel, for NRA. Others who helped write the reports (STEEL, Dec. 10, p. 16) also may participate.

NRA

THE new form of NRA will not include any price maintenance provisions or other mechanisms "for putting floors under prices," S. Clay Williams, chairman of the national industrial recovery board, predicted in New York, Dec. 13, in his first address since taking office.

What will be retained, Mr. Williams predicted, will be collective bargaining, maximum hours and minimum rates of pay. He advised manufacturers who are complying with wage and hour provisions of their codes "to lend every effort to the cause of requiring everyone of your competitors also to comply."

W. Averill Harriman, division administrator, said Friday the recovery board has not yet drafted a bill for the continuance of NRA and doubted whether detailed information could be in the President's hands for his first message to congress, which will be heard Jan. 3.

WITHEROW IS ADVANCED

William P. Witherow, of the former Witherow Steel Co., Pittsburgh, Friday was appointed vice chairman of the NRA industrial advisory board and chairman of the resident member group, effective Jan. 1.

Labor

ORGANIZED labor last week appeared intent on forcing the issue of majority rule in the iron and steel industry. Complaining that Clayton Mark Mfg. Co., Chicago, has refused to recognize it as a representative of all employes after it won the recent election, the Amalgamated Association of Iron, Steel and Tin Workers won from the national steel labor relations board a hearing in Washington Dec. 19.

PRESIDENT FOR LABOR CLAUSES

The President Friday informed William Green, head of the American Federation of Labor, that government supervision of codes will be continued, and that he is not going to abandon NRA labor clauses, including wage and hour provisions. Mr. Green asked that section 7a, pertaining to collective bargaining, be continued; presumably the Presi-

(*Please turn to Page* 56)

EVIDENCE OF A TRUCE between government and industry is given above, with Donald R. Richberg, chief spokesman of the administration, on the left and C. L. Bardo, re-elected president of the National Association of Manufacturers, on the right. This photograph was taken at the meeting of the industrial leaders in New York Dec. 5, when a platform for industry (STEEL, *Dec. 10, p. 14*) *was adopted*

Production

STEELMAKING operations spurted to 33½ per cent last week, an increase of 3½ points, due largely to specifications from the automobile industry. The trend in sentiment appears to be somewhat on the upgrade. If the rate holds at about this level over the rest of the month, December is insured an average much higher than November. Indications are that the rate will increase still further this week. Details for various districts follow:

Youngstown—Lifted 4 points last week to 39 per cent, and the rate is expected to reach 41 per cent at this week's start. Youngstown Sheet & Tube Co. lighted two additional open-hearths at its Campbell works, making nine active. The company is also preparing to blow in a blast furnace. A total of 33 or 34 open hearths is scheduled for melting.

Chicago—Increased 1½ points to 35½ per cent last week. Several producers anticipate early additions of open hearths, and a higher rate is in prospect for this week. Blast furnace operations are unchanged at 9 active steelworks stacks out of 36.

Detroit—Advanced 11 points to 59 per cent last week, one producer scheduling all open hearths, making a total of 10 out of 17 furnaces in the district active. Although Ford has heat on in four open hearths, only two of these are actually melting, due to a shortage of scrap.

Cleveland-Lorain—Up 11 points to 59 per cent, National Tube Co., Lorain, operating ten open hearths, Corrigan, McKinney Steel Co. nine, and Otis Steel Co. four. National Tube has lighted another blast furnace at Lorain now operating two and Interlake Iron Corp. another stack at Toledo, O., operating both units there.

New England—Held at 47 per cent last week, with indications of an increase of a few points this week.

Wheeling—Unchanged at 70 per cent through last week, with 26 open-hearth furnaces continuing active in the district.

Weirton Steel Co. added 10 hot mills in its tin plate plant at Weirton, W. Va., Sunday, making 20 out of 26 in operation.

Pittsburgh—Up 1 point to 24 per cent last week, advances being led by open-hearth rates of the independents, plus an improvement registered by a leading interest through improved demand for the latter's semifinished output, especially sheet bars. Some producers here continue to stock ingots actively against an improving rate of finishing mill operations expected in the first quarter.

If the present open-hearth improvement continues it is likely that resumption of additional blast furnaces can be expected from the pres-

ent rate of 12 out of 60 in blast. Carnegie Steel Co. has 6 of 32 blowing, Jones & Laughlin Steel Corp., 3 of 11, Pittsburgh Crucible Steel Co. and Pittsburgh Steel Co., each 1 of 2, and Bethlehem Steel Co., 1 of 7 at Johnstown, Pa.

Central eastern seaboard—Down 1 point to 19½ per cent last week. A further mild decline may take place this week, reflecting dullness of the approaching holiday season. Finishing operations at the moment are better than steelmaking production, with some leading producers drawing on ingot stocks. Reading Iron Co. has resumed operations at its puddling mill at Danville, Pa., for the first time in four months, employing more than 250 men in three shifts.

Buffalo—Stationary at 24 per cent last week, nine out of 38 open hearths being active. For this week, the rate is uncertain, some forecasts being that a shutdown of 10 to 12 days will take place at the holiday season, while others predict the recent improvement in demand will continue. Orders from automotive districts are held responsible for the steelmaking rate holding its own at a time when declines usually are the rule.

Birmingham—Jumped 5 points to 32½ per cent, due to increases at the rail mill. Tennessee Coal, Iron & Railroad Co. is operating six out of nine open-hearth furnaces at its Fairfield works.

U. S. STEEL CORP. SHIPMENTS

(Inter-company shipments not included)

(Tons)

	1934	1933	1932	1931
Jan.	231,777	285,138	426,271	800,031
Feb.	385,500	275,929	413,001	762,522
March	588,209	256,793	388,579	907,251
April	643,009	335,321	395,091	878,558
May	745,063	455,302	338,202	764,178
June	985,337	603,937	324,746	653,104
July	369,938	701,322	272,448	593,900
Aug.	378,023	668,155	291,688	573,372
Sept.	370,306	575,161	316,019	486,928
Oct.	343,962	572,897	310,007	476,032
Nov.	366,119	430,358	275,594	435,697
11 mo.	5,507,243	5,160,313	3,751,646	7,331,573
Dec.	.....	600,639	227,576	351,211
Yrl. adj.	.....	44,283	5,160	6,040
Total	.....	5,805,235	3,974,062	7,676,744

CORP. SHIPMENTS HIGHER

Shipments of finished steel by the United States Steel Corp. in November were 366,119 tons, an increase of 22,157 tons over the 343,962 tons shipped in October. Cumulative total of shipments for 11 months of 1934 is 5,507,243 tons, compared with 5,160,313 tons for 11 months of 1933, 3,751,646 tons for the same period in 1932 and 7,331,573 tons for 11 months of 1931.

Dawes Sees Durable Goods Quicken Recovery in Spring

NOT later than next June or July will come the beginning of a great sustained demand for durable goods, due to the accumulation for five years of postponed demands, and at this time will also open a year of business prosperity.

Such was the prediction of Gen. Charles G. Dawes, former vice president, in addressing the Chicago association of commerce, Dec. 12.

This forecast of the end of the depression and the beginning of a genuine upswing is based upon a study of pig iron prices and production, and steel prices during the depressions of 1873 and 1893. Laying the pattern of these depressions over the current one, General Dawes finds next spring the zero hour.

This recovery, as General Dawes views it, is resulting because mass confidence is being re-established, not by decree or plans but by the operation of the laws of human nature.

Said General Dawes in part:

In comparing the three depressions, it is clearly demonstrated that the artificially stabilized scale of iron and steel wages and prices during this present depression caused a precipitant and enormous decline in production, as compared with lesser declines in the former depressions when wages and prices were allowed to follow their natural course.

The production of pig iron rapidly declined from October, 1929, the beginning of this depression, from an average of 116,000 gross tons per day to an average of 17,000 gross tons per day in a period of two years and ten months, or until in September, 1932. Pig iron production in May, 1893, the beginning of that depression, declined from an average of 24,000 gross tons per day to 10,500 gross tons per day in five months time, which was the lowest point of production for that depression; but thereafter gradually increased in amount until the end of a period of two years and ten months, or until in March, 1896, it had reached an average of 26,000 gross tons per day.

More in 1896 Than in 1932

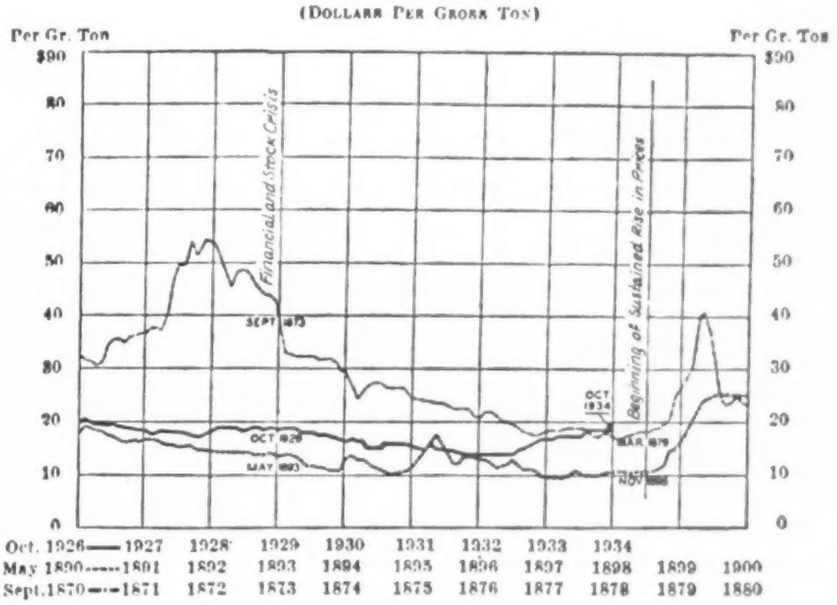
In other words, in 1896, the 70,885,000 people then in the United States, were actually using daily 9000 tons of pig iron more than the 126,189,000 people in the United States were using in 1932, at the same relative time—a two years and ten months period after the beginning of the two depressions. For the panic of 1873, the records of pig iron production are limited, and only an average annual estimate is available.

It would seem that the artificial price level of this current depression, which has cut consumption of heavy durable goods to a relatively lower level than in the two earlier depressions, may possibly delay for a little longer than in the former depressions, the time when the consolidated

(*Please Turn to Page* 77)

PIG IRON PRICES

(Dollars Per Gross Ton)



1926-1934 Composite Pig Iron Price
1890-1900 Bessemer Pig Iron at Pittsburgh
1870-1880 No. 1 Anthracite Foundry Pig Iron

$100,000,000 Is Being Spent For Steel Mill Equipment

NEW equipment! A vital and interesting development that now holds the industrial spotlight has been the recent reawakening by steel mill and some metal-fabricating interests in the matter of plant rehabilitation.

Since late September, growing manifestations of this revival have cheered especially the steel mill equipment market. By last week evidences of this stir had touched a peak for any time since 1930. A swelling volume of export demand for new rolling mill equipment has also garnered its share in this revived market.

Doubtless the near possibility of a tax on corporate surpluses is loosening buyers' purse strings at this time, but there also is evidence of genuine and long overdue requirements in present mill equipment inquiries.

Last week it was reported at Pittsburgh that Carnegie Steel Co. was soon to inquire for two new 4-high plate mills of modern type for its Homestead works to replace old 2-high plate mills.

Many Changes in Offing

Among other work which Carnegie Steel Co. plans for eventual appropriation (and then subsequent inquiry) through United States Steel Corp. headquarters in New York is a continuous hot strip mill at Edgar Thomson works, enlargement of many of the 60-odd open-hearth furnaces at Homestead works, modernization of its rail mill at the Edgar Thomson works and other sweeping mill equipment changes at its various Pittsburgh divisions.

Carnegie is now engaged in building a 42-inch hot strip mill at Youngstown, O., foundations of which were under way last week. This appropriation went through only a short time ago. It is now reasonable to expect others will follow.

National Steel Corp.'s headquarters at Pittsburgh late last week made an important announcement affecting its Great Lakes Steel Corp. division at Detroit. Sometime within the next six months about $12,000,000 will be spent by the parent company at that works in new mills and equipment, leading of which will likely be a continuous strip-sheet mill.

This development has been contemplated for the past year, and many types of new rolling mill equipment in the interim have been considered. At one time, a few months ago, it was reliably reported that a steckel-type mill would be decided upon. However, last week E. T. Weir, National Steel's chairman, said definitely that orders would be placed and actual construction started within the next six months, probably on a continuous mill.

Bethlehem Steel Co. is also prominent in the race for new equipment. This company's inquiry for a continuous strip-sheet mill has been reported in steel mill equipment circles for some months, but it was confirmed from this concern's headquarters a week ago that about Jan. 1, when appropriations are expected to be asked for and approved, a hot-strip mill of either 60 or 66-inch width will be decided on for the Lackawanna works at Buffalo.

It will be recalled that Bethlehem a few years ago took over the former Seneca Iron & Steel Co. at Buffalo, operating a sheet mill, and it is doubtless to modernize this works, plus gaining firmer footholds in the Detroit market on the flat-rolled steels, that motivates this lake-mill expansion. From time to time reports have stated that Bethlehem might also install a continuous mill at its Sparrows Point, Md., works.

Ford Motor Co.'s announcement last week to spend an additional $7,500,000 for expansion of its River Rouge plant includes $2,120,460 for foundry and blast furnace equipment, part of which has already been awarded, and $230,000 for a stripper building to handle ingots. Contracts have already been awarded for the balance of the $19,666,521 program, including $6,111,923 for the hot-strip mill and $3,460,000 for the cold-strip mill, and $4,599,888 for power house units. Most of the steel rolling mill equipment is being built by United Engineering & Foundry Co., Pittsburgh.

Recent expansion amounting to $500,000 by Republic Steel Corp. at Youngstown, O., for a new electric weld tube mill building brings the construction program under way in the Mahoning Valley into well over $15,000,000. Youngstown Sheet & Tube Co., completing its $7,000,000 mill at Campbell works, plus the aforementioned Carnegie Steel strip mill, both make up the major part of this total.

Aetna-Standard Engineering Co., Youngstown, is expected to begin manufacturing a new tube-reducing machine under patents held by the Tube Reducing Corp., New York. It is claimed that orders received for this type of equipment are already valued at approximately $100,000, which will engage the capacity of Aetna-Standard plants at Ellwood City, Pa., and at Warren, O., for some time.

Rust Engineering Co., Pittsburgh, recently received contracts for new slab heating furnaces to be installed in the Youngstown district for the Carnegie company, in connection with the latter's new continuous strip mill. Furnaces will be of the Rust zone-control type. The Rust company also is rebuilding the three slab heating furnaces on the 28-inch mill of the Illinois Steel Co. at Gary, Ind., also of the zone-control type.

In the export field for steel mill equipment there are persistent reports, emanating especially from Washington, regarding the revival of Russian rolling mill equipment orders which would benefit primarily the leading Pittsburgh builders.

A year or so ago, Russian interests came to this country desiring to build several American rolling mills in the Soviet. One large installation was to be at Dnieperstroy. However, financing details have always balked this attractive Russian business from coming to American builders.

Russians Would Build Mills

American equipment builders want some definite understanding as to payment and at last report were standing firm on their prices. The latest Russian counter offer that was reliably reported last week was for the Americans to furnish the drawings and send engineers to Russia, with the Russians to build the equipment themselves. This, of course, is dependent upon the failure of out-and-out sales. American equipment shops are still hopeful of negotiating the latter.

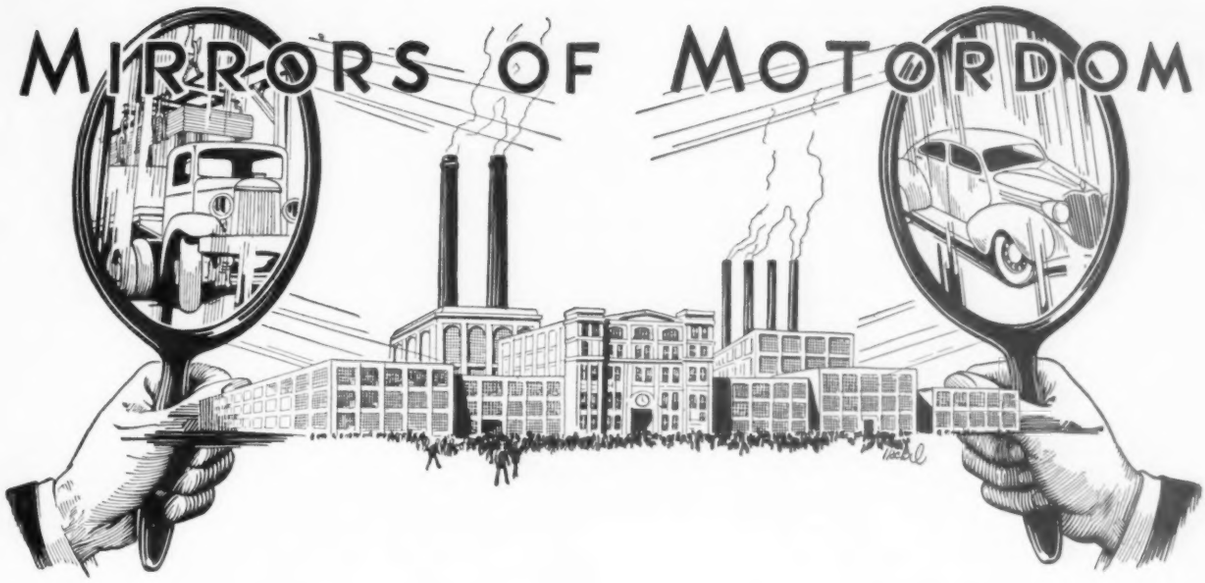
Japan is a prominent interest in the American equipment market at present. A week ago a Japanese

(*Please turn to Page* 16)

Corp. Pledges $40,000,000

UNITED STATES STEEL CORP. has pledged itself to spend $40,000,000 on modernization next year, about the same as for 1933, James A. Moffett, federal housing administrator and former Standard Oil vice president, said Friday at a luncheon of the New York Advertising club. Other pledges include $60,000,000 to $70,000,000 by the Standard Oil Co. of New Jersey and $200,000,000 by the American Telephone & Telegraph Co., the latter for rehabilitating existing properties. Mr. Moffett predicted a billion dollar gain in business in 1935, with substantial increases in plant modernization generally.

MIRRORS OF MOTORDOM



DETROIT

STEEL is going to get the most free advertising in many years when automobile manufacturers open up their sales campaigns.

General Motors will play up graphically what it terms the new "turret top"—a solid steel top with supporting steel members—on some lines.

Hudson-Terraplane for a certainty, and possibly also Ford, will feature a steel top. In the case of Hudson-Terraplane, the steel top is a sheet substituted for the previous soft top and is not integral, in an exact sense, with the curved roof sides.

Chrysler will become the apostle of molybdenum steel. On Plymouth and Dodge it is eliminating coil springs and substituting semi-elliptic carbon-molybdenum steel springs of about 0.25 per cent molybdenum content.

WILLS BEHIND DEVELOPMENT

Moving parts of Plymouth and Dodge, and presumably also Chrysler and DeSoto, will also strongly feature molybdenum steel. It will be recalled that C. Harold Wills, one-time builder of the Wills-St. Claire, hailed his product as a molybdenum car, and it is Mr. Wills who has worked with the Chrysler engineering staff in the development of new steels.

Differing emphasis will be placed upon steel. General Motors will sing its praises for safety, and there are some who believe that its adoption of an all-steel top is the forerunner of an all steel body by an interest which heretofore has been wedded to a composite body.

Chrysler will stress the soft ride afforded by molybdenum, or rather, mola springs—mola being its coined name. Hudson-Terraplane, with the elimination of its soft top, becomes a genuine all-steel car.

PLYMOUTH'S mola springs permit the use of thin leaf sections in front, and although the springs are shorter than those used on the rear of the car, their flexibility gives about the same vibration frequency as that of the rear springs—90 per minute in front and 85 in the rear. The spring uses two main leaves, each of which is wrapped around the shackle bolt, the lower leaf being segmented at the center to allow for elongation. Leaves are thinner at the ends than at the center.

Redistribution of the weight of the car, including forward movement of the motor, evenly divides the load between the front and rear springs, contributing further to even riding.

Double action shock absorbers also are employed on the front end of the Plymouth and Dodge, while a torsion bar, located in the front, serves to eliminate sidesway in rounding curves by reinforcing either spring when needed. Dodge uses a tubular front axle. Conventional Chrysler models retain the more expensive coil springs.

Increased use of molybdenum alloys elsewhere on the various Chrysler lines, including Plymouth, Dodge and DeSoto, also has been effected, with nickel-molybdenum steels employed more generally than in the past in the transmission, rear end and steering gear parts. It is interesting to note that molybdenum consumption as a steel alloying element has jumped rapidly the past decade.

ENGINE COOLING IMPROVED

Plymouth has changed the arrangement of its motor cooling chambers. Water jackets now completely surround the cylinder bores to give a more even temperature throughout their length, while a trough has been introduced in the block to carry water to the rear cylinders which generally are much hotter than those at the front. The latter arrangement gives uniform cooling to all cylinders and exhaust valves. Benefits of these changes are most apparent at highest speeds.

Another motor feature is an automatic spark control which operates from the vacuum in the intake manifold. This control retards the spark automatically during rapid acceleration, while allowing for maximum advance without engine detonation.

Studebaker, which has just announced its 1935 models, fired the opening gun in the campaign on riding qualities, with its independent planar wheel suspension. General Motors, it can be definitely stated, is adhering to its knee-action springs except, as in the case of Chevrolet, where the standard model has always been mounted on front semi-elliptic springs.

WHILE Ford is increasing its production of new passenger cars, their introduction is at least a

Automobile Production

Passenger Cars and Trucks—U. S. Only

By Department of Commerce

	1932	1933	1934
Jan.	119,344	128,825	156,907
Feb.	117,418	105,447	231,707
March	118,959	115,272	331,263
April	148,326	176,432	354,745
May	184,295	214,411	331,641
June	183,106	249,727	308,051
July	109,143	229,357	266,575
Aug.	90,325	232,855	234,809
Sept.	84,150	191,800	168,872
Oct.	48,702	134,683	132,448
Nov.	59,557	60,683	75,000*
Year to date	1,263,325	1,839,492	2,702,084

*Estimated.

Estimated by Cram's Reports

Week Ended	
Dec. 1	11,389
Dec. 8	19,347
Dec. 15	24,851

week distant. Originally, their debut was scheduled for Dec. 8. Now, Dec. 22 appears to be the earliest date. Last Saturday Ford announced the line of V-8 trucks for 1935.

Probably foreshadowing the announcement of the passenger series, the V-8 engine in the truck has one major change from 1934—a directed-flow crankcase ventilation system. Mounted at the rear of the engine is a screened scoop which replaces the oil filler cap. The fan forces air into the scoop and down into the crankcase, then up through openings into the valve chamber and forward to an outlet at the front, through which the vapors pass to the outside.

CLUTCH ACTION SOFTER

Another feature of the new Ford truck is a softer clutch, reducing the pedal pressure at idling speeds. Centrifugal force developed by means of weights at the outer ends of the clutch release levers is applied as the engine speed increases, to insure maximum resistance to slippage.

Ford last week assembled 3000 cars, an increase of 1000 over the preceding week. The curiosity—and also the concern—of the automobile industry will not be satisfied until the price of the new Fords is known. Credence still is placed in the report Ford will sacrifice profits to volume.

In general, the 1935 Fords will be much more streamlined. The beavertail rear will be more pronounced in its flare at the bottom and the hood will be slightly narrower. Louvres will probably be the horizontal checkered type, of the general style of Pontiac this year. Incidentally, the new Hudson-Terraplane louvres will be of this type. Ford will probably emphasize a new four-door six passenger touring sedan.

CHEVROLET, it is understood, will offer three lines in 1935, adding a thrift series to its standard and master models. Pontiac, which in 1934 was an eight, will supplement this eight with two sixes. General Motors thus will have three Chevrolet sixes, two Pontiac sixes and an Olds six, to tempt buyers in the low-price and low-medium price class.

DeSoto will have conventional-type cars for sale at prices below the airflow models which, however, are being continued, in contrast to only the latter series this year. Chrysler's line will be broadened to include both a six and an eight in the conventional style in addition to the airflows.

Hudson has inserted a new Hudson six between the Terraplane eight and Hudson eight. The sharp gain in Hudson sales this year—from 2728 to 17,375 for the first ten months—aided materially in the marked recovery in total Hudson-Terraplane production for 1934, and the new six gives the company better coverage in the $700 and $800 price class.

Prices announced last week by Hudson for 1935 show reductions of $15 to $35 from present models. Without waiting for Ford to disclose its price ideas, Hudson has cut delivered prices on the new Terraplane $32 to $47.50, partly through lower charges for standard accessories. These cars will range from $585 to $725; the new Hudson six from $695 to $790; the Hudson special eight from $760 to $860; the deluxe eight from $845 to $955; and custom models from $1125 to $1195.

HUDSON GETS "BABY FACE"

Hudson received some neat publicity in the recent shooting of Gangster Nelson. When Nelson last summer succeeded to the dubious title of his former superior-in-crime, Dillinger, he retained the latter's penchant for Ford cars in effecting his hasty, and often unexpected, travels. Recently, federal officers at Chicago countered by equipping themselves with Hudson cars. In Nelson's last attempt to evade capture, his pursuers in their Hudson were able to overtake and halt their quarry, subsequently engaging in the fatal gun battle.

The new Buicks which were shown Saturday are essentially the same as the 1934 cars in styling, major changes being reserved for next spring or later. Production recently has been approximately 1000 cars weekly.

H. H. Franklin Mfg. Co. plant and business brought $278,750 at its recent sale. Franklin Motors Inc., the buyer, is reopening the plant and expects to introduce new cars late next spring.

AUTOMOBILE production is gaining momentum, and with advances shown on a number of fronts, the low November rate steadily is being left behind. While expanding activities among the leading manufacturers chiefly are responsible for the rising total, several of the smaller interests, including Hudson and Studebaker, contribute substantially to total assemblies.

Ford has issued steel releases for 70,000 units, of which number 45,000 may be accounted for in December. Heavier releases also have appeared from Chevrolet and the Chrysler group, and total output this month appears likely to pass the 100,000 mark by a good margin. The comparison with 80,565 cars and trucks assembled in December, 1933, is an indication of the improved situation existing today as regards progress in tooling for new models, the status of dealers' stocks and the general outlook for the coming year's automotive business.

Delays in completing tool and die work were responsible in a large degree for retarding production a year ago. Last week all but a few of the smallest manufacturers were turning out new models.

$100,000,000 for Mill Equipment

(*Concluded from Page* 14)

steel company purchased a 68-inch 3-high rolling mill from Lewis Foundry & Machine Co., Coraopolis, Pa., complete with accessories.

At the same time other Japanese steel producers are inquiring for rolling mills. One inquiry at present is for a rougher and two 3-high sheet mills, and another steel mill in Japan is asking for prices on a large plate mill.

Still a third prominent Japanese inquiry is for a continuous strip mill. Most of these inquiries are being handled through New York brokers and several are for replacement in Japanese steelworks which were recently destroyed by a tidal wave in the Osaka district.

Last week the Lewis company received another export order, this being for a complete semicontinuous zinc strip rolling mill installation for the Ever Ready Co., London, England. This order comprises roughing and finishing mills, tables, coilers, blockers, transfer tables and manipulating equipment. In this installation the handling of the metal will be entirely automatic from the time it leaves the melting ladle until it reaches the warehouse in final finished form as rolled zinc strip.

The Lewis company, which is now building various types of rolling mills for Canadian and Australian concerns, as well as Japanese and English buyers, is building a duplicate of the Ever Ready Co. installation for Ball Bros., Muncie, Ind.

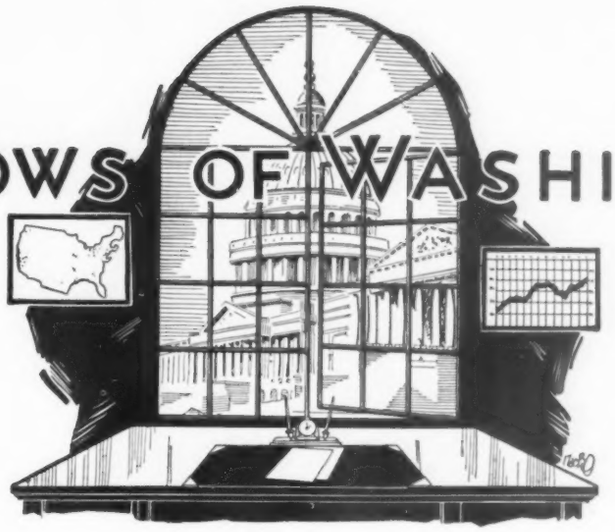
Another prominent foreign order was announced a few months ago by Mackintosh-Hemphill Co., on a 3-high, high-speed sheet mill for the Tata Iron & Steel Co., Jamshedpur, India. Mackintosh-Hemphill Co. a few weeks ago began shipping this order to India (see p. 24).

Reports in steel mill equipment circles also favor the early closing on a tin plate mill to be erected at Hamilton, Ont. This latter, however, has been considered for some time. Another prominent export development was the purchase last week by the Italian government of a round number of screw machines.

Pittsburgh Lectromelt Furnace Corp. exhibited to a number of visitors at its Pittsburgh shops, Dec. 15, an electric furnace which it will soon deliver to the International Nickel Co.'s Huntington, W. Va., works. This furnace is rated as a 20-ton unit.

Youngstown Sheet & Tube Co., Youngstown, has contracted for the construction of one three-hole and one four-hole battery of one-way fired soaking pits by Surface Combustion Corp.

WINDOWS OF WASHINGTON



WASHINGTON

HIS public ownership propaganda junket through TVA territory and subsequent vacation at Warm Springs appear to have invigorated the President to a greater degree of activity than at any time since he moved into the White House in March, 1933.

The number of political and economic balls he is juggling in mid-air is genuinely prodigious. At the same time, he has injected several new issues, gives the impression that he is about to pull at least one enormous rabbit out of the hat, is conferring on the budget and beginning to assemble material for his message to congress.

More than either the industry or the public realizes, the shafts at munitions makers, both through the Nye-Vandenberg committee hearings and the President's proposal for restricting profits on munitions, are oblique attacks upon iron and steel.

ALL MILLS IN LINE OF FIRE

Under the blanket designation of both the President and congress, practically every iron and steel plant in the country falls into the munitions category. Any producer making iron and steel required for the building of warships or the manufacture of shells, armor plate, guns, even railroad equipment used in supply service behind the lines, is munitions maker—and it might be added that the administration is weaving a deft web of hostile public opinion around munitions.

For example, note the Nye-Vandenberg committee's "disclosure" that in 1917 the United States Steel Corp. earned $585,000,000 on an investment of $1,660,000,000, or 35 per cent; in 1918 the Corporation's profit is placed at 29 per cent. Also for 1917 or 1918, profits of Jones & Laughlin are placed at 47 per cent, Bethlehem Shipbuilding 40, Allegheny Steel 78, Nagel Steel 319, Follansbee 112, West Penn 159, Bethlehem Loading 368, American Brass 23, New Jersey Zinc 95, and so on.

No distinction is drawn between war and commercial production—the results of either war year are accepted as conclusive of extraordinary, and presumably unwarranted profits. Having stolen the thunder of the congressional committee last week with an announcement he is going to draft anti-profit legislation, the President may also have blunted the edge of the American Legion's demand for bonus legislation by taking a fall out of industry.

JOHNSON BACK IN HARNESS

In 1928, it will be recalled, the war policies commission recommended that the government seize 95 per cent of all wartime profits in excess of the average of the three years preceding the war period, and that prices be frozen at the level existing when hostilities develop. Any war developing over the next few years would find steel stockholders automatically in the class of $1 a year men, judging from the deficits since 1930.

Having participated in the conferences leading to the draft law in 1917, General Johnson, of NRA fame, is on the President's special committee to propose legislation hobbling the munitions industry. Others are Bernard Baruch, Secretaries Dern, Swanson and Morgenthau, Army Chief of Staff MacArthur, Under Secretary Tugwell and Assistant Secretaries Roosevelt and McGrady.

The emergence of General Johnson, who has virtually been in retreat since leaving NRA early in October, has given rise to much speculation. There are many rumors that the general would succeed to the direction of the public works program, and that he will head up the social and security legislation to be sought by the administration.

There has been the faint suggestion that Secretary Ickes will eventually suffer the fate that the President has meted out to those of his official family who have not quietly meshed in, such as Professor Moley, George Peek, General Johnson and several others. That is, decapitation. On the other hand, over recent months he appears to have moved farther to the left and thus his thinking more nearly dovetails with that of the President himself.

The rabbit about to be drawn from the hat may be a startling program for employment. In New York last week Secretary of Labor Perkins hinted that a forthcoming report of the committee for economic security would include a plan that would provide employment for every able-bodied person for 25 years. That, it will be readily agreed, is some rabbit.

STILL NO HOUSING PROGRAM

Scarcely inferior to it would be a program for low-cost housing. A list of manufacturers, including steel, who have been contacting various agencies of the government in regard to proceeding with housing projects would be startling, and generously support the contention of this department that housing appears to offer the greatest possibilities of any recovery plan advanced thus far.

Labor is one of the balls the President is juggling. Not only are there discussions whether labor should be treated separately or in any new NRA legislation, but the situation as regards iron, steel, rubber and automobiles also is receiving consideration. Labor has lost ground with the President over the past few months. The position of steel has been enhanced since it has offered to treat with the Amalgamated association, and the latter has been standing on a technicality.

Assistant Secretary of Labor McGrady last week proposed conversations between labor, on the one hand, and the National Association of

Manufacturers and the Chamber of Commerce of the United States, on the other. There is a hint that perhaps automobile, textile and steel workers will gang up on these two representatives of industry.

Myron C. Taylor, chairman of the United States Steel Corp., was in Washington Thursday for a meeting of the business advisory and planning council of the department of commerce, and it could not be confirmed whether he also was continuing negotiations with the steel labor relations board in regard to the proposed truce.

NRA REFUTES "DODO" CHARGE

Characterized as "dead as a dodo" by General Johnson, NRA last week rushed for the oxygen. In New York, S. Clay Williams, head of the new recovery board, painted a picture of a resuscitated NRA with price regulations entirely omitted. A week ago, it will be recalled, he favored retaining what he termed such values as limitation of hours, minimum rates of pay, and collective bargaining. A "pep" meeting of NRA workers Thursday night was staged to offset the Johnson sentence of extinction.

Meanwhile, in Washington there is considerable opinion that the NRA advisory council, on which sit an equal number of representatives of the labor, consumers' and industrial advisory boards, has outlived its usefulness. On some important cases recently the tendency has been for the consumer and labor representatives to make common cause against industry, with some internal friction resulting.

LAST Friday the cotton growers of the South went to the polls in a referendum on whether the provision for compulsory limitation of acreage in the Bankhead act should be extended for one year.

Since the President ten days ago announced that he will ask the next congress to make an exception of those who market two bales or less annually, it is assumed that at one stroke he rallied about 600,000 farmers to the cause of compulsory control.

These 600,000, representing about one-third of the total of growers, thus were placed in the happy position of being able to favor restrictions on larger growers, which would at the same time raise the price of their own crop.

There have been unkind comments on this gesture, and some comparisons with the emphasis the relief administration placed upon relief allotments just prior to the general election in November.

Commentators on public affairs who are as impartial as anyone can be in these stressful days are watching the results of this referendum carefully. For one thing, they visualize a policy of compulsory restriction of production as a step toward nationalism. By curtailing production of cotton and raising prices, the participation of the United States in world markets will be narrowed. Ultimately, this must have some effect on exports of iron and steel, as well.

For another thing, if a farmer can be prevented from using part of his productive acres; if every bale of cotton he markets must have a government tag affixed to it; and if he be subject to confiscatory penalties for any surplus, this principle might be applied at some later date to iron and steel.

Of course, the present problem in iron and steel is to increase rather than to restrict production, but a precedent might be established. Conceivably, the government might decree that production beyond a certain percentage of capacity is illegal and levy a heavy penalty on any overage. As a matter of fact, the suggestion has been made that the government should buy up a certain percentage of steelmaking capacity and scrap it.

Diametrically opposite to the program in Washington but based upon the same underlying theory of regimentation is the recent "trial balloon" that to expedite recovery the government should subsidize production and take off the market the excess that cannot be absorbed by private consumers, and which would tend to depress the price.

PROGRAM IS NOT LIKELY

There is no serious thought at the moment that such a program can be enacted, and the grief the Hoover administration encountered in attempting much the same thing in purchasing surplus grain is still poignant, but it is interesting as revealing a phase of the new deal's state of mind.

Assume that the goal is to lift production to a level where it would absorb practically all of the personnel of the steel industry in 1929. For practical purposes, this would mean the level of May, 1934, when the industry was employing 449,362 persons, or 97 per cent of 1929.

In May, the daily average output of open-hearth and bessemer ingots was 124,174 gross tons. Had an effort been made in November to speed up the industry to the 1929 level of employment, an increase of 63,057 tons daily in ingots would have been necessary; in other words, the government would have had to buy 63,057 tons of ingots daily.

Ingots are not quoted in the open market, but with billets at $27 and sheet bars at $28, a price of about $25 for ingots might be assumed. The government's daily purchases of ingots thus would have been $1,576,425. This is at an annual rate of $490,268,175, reckoning 311 working days to the year.

By way of comparison, since the fiscal year beginning July 1 the federal relief administration has spent $476,000,000, the AAA $100,000,000 while normal government expenses have been $1,290,000,000.

Thus do new deal theories and hard facts conflict.

Died:

JAMES R. VANDYCK, 63, president, Vandyck-Churchill Co., New York, machine tool dealer in Hackensack, N. J., Dec. 11. He organized the J. R. Vandyck Co. in 1901 and in 1904 the company became the Vandyck-Churchill Co. He has served as president of the company since. He was a charter member and former president of the Machinery club, New York, and was also secretary and former president of the Associated Machine Tool Dealers' association.

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Grant T. Hollett, 50, engineer for the Illinois Steel Co., South Chicago, Ill., in Chicago, recently.

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Fred W. C. Neuner, 44, co-owner of the Connersville Tool & Die Co., Connersville, Ind., at his home there recently.

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B. Frank Key, 48, graduate of Cornell university and a mechanical engineer for the Westinghouse Air Brake Co., Wilmerding, Pa., in Pittsburgh, Dec. 10.

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Hilary M. Lessing, 67, retired president and general manager of Sotter Bros. Inc., Pottstown, Pa., boiler manufacturer, at his home in that city, Dec. 9.

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Loren L. Prescott, 64, vice president of the Prescott Co., Menominee, Mich., pioneer manufacturer of boilers, engines and saw and planing mill machinery, Dec. 10.

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E. T. Edwards, who operated under his own name two rolling mills at Columbia, Pa., in the rerolling of reinforcing bars and other forms, at a hospital in Lancaster, Pa., Dec. 9.

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Russell L. Davis, 52, general superintendent of the Cleveland plant of Otis Steel Co., at his home in Cleveland, Dec. 12. At the age of 16 he went to work for the American Steel & Wire Co. in Cleveland, continuing there for 22 years, when he became associated with Otis.

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Axel O. Ihlseng, 79, retired consulting mining and metallurgical engineer, in Lancaster, Pa., Dec. 9, while enroute to Florida for the winter. From 1877 until 1908 he was metallurgist for a number of mining companies in the Colorado and Missouri districts. During the World war he was a government consultant.

Industrial Men in the Day's News

Frederic Crosby, New President, American Hoist & Derrick Co.

A son of one of the founders of this company, he has been in charge of production since 1922.

He has long been active in civic life of St. Paul, this year directing the city's community chest campaign.

A director of the district's NRA compliance board, he is also a member of the labor relations board.

FREDERIC CROSBY, as noted in STEEL for Oct. 29, has been elected president of the American Hoist & Derrick Co., St. Paul, succeeding Frank J. Johnson, who has resigned because of ill health. Mr. Crosby was born in St. Paul in 1887, attended the University of Minnesota, and spent his apprenticeship in the plant of the American company.

Working his way through various departments, in 1922 he was named general manager in charge of production, and in 1928 vice president in charge of production.

For several years he has been active in civic affairs of St. Paul, serving as director of the St. Paul Association of Commerce, vice president of Citizens Alliance, a director of the NRA compliance board, a member of the national labor relations board, and this year is campaign manager of the city's community chest.

In 1933 Mr. Crosby was president of the Minnesota Club of St. Paul, and for a number of years has been president of the board for the Neighborhood House in that city.

He is a son of Oliver Crosby, who in 1882, with Mr. Johnson, founded the American Mfg. Co. to build small hand power hoists and derrick equipment. The latter company was reorganized in 1892 as the American Hoist & Derrick Co., enlarging manufacturing facilities and producing a complete line of hoisting and earth moving machinery, including power hoists, steel derricks, railroad ditching and maintenance equipment, locomotive cranes, shovels, sugar cane handling machinery, the Crosby wire rope clip and kindred items.

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John R. Gregory has been appointed first assistant general manager of sales for the the Columbia Steel Co., San Francisco, subsidiary of United States Steel Corp. W. A. Ross is vice president and general manager of sales.

Forrest G. Harmon and W. B. Sawyer Jr. have been named assistant managers of sales; H. J. Bennett director of sales promotion; T. E. Banning traffic manager; J. D. Fenstermacher manager of sales in the San Francisco district; and Harry G. Parcell assistant manager of sales in the San Francisco district.

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Fred J. Walls, metallurgist with the Eaton-Erb Foundry Co., Vassar, Mich., has been appointed to the development and research staff of the International Nickel Co. Inc., New York, and will be concerned with development of the use of nickel cast irons, particularly in the automotive and machine tool industries. Prior to his association with Eaton-Erb, Mr. Walls was metallurgist at the Wilson Foundry & Machine Co., Pontiac, Mich., for 18 years. He has been active in the American Foundrymen's association, American Society for Testing Materials and the American Society for Metals.

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Allan Seymour, sales engineer of the grinding wheel division of Norton Co., Worcester, Mass., has been appointed manager of the company's Philadelphia office. Ralph M. Johnson, hitherto district manager, succeeds Mr. Seymour in Worcester.

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James F. Howard has been elected secretary and treasurer of National Enameling & Stamping Co., Milwaukee, succeeding the late J. H. Hahn.

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John J. Campbell has been named district sales manager in New York for the Eastern Roling Mill Co., Baltimore. He will have charge of sales of various grades of sheets made by the company.

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C. Parker Holt has been named executive vice president of the Caterpillar Tractor Co., Peoria, Ill. Thomas J. Conner has been elected vice president in charge of manufacturing, also a director to succeed the late Pliny E. Holt.

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Allan R. Kelso, former factory manager of the Continental Motors Corp., Muskegon, Mich., and more recently active in an executive capacity for the Fisher Body Corp., Detroit, has been appointed factory manager of the Motor Products Corp., Detroit.

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W. H. McDowell has been appointed sales manager in the Kansas City, Mo., office of the Universal Atlas Cement Co., Chicago, subsidiary of the United States Steel Corp. He succeeds C. S. McArdle, resigned. Mr. McDowell joined the Atlas organization in 1911 and has served in Pittsburgh and Cleveland territories. At one time he was associated with the H. C. Frick Coke Co.

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A. Bair Bassoff, formerly production engineer for the Worth Steel Co., and more recently consulting engineer for the Sier-Bath Co., has been appointed executive engineer of the S-B Gear Corp., New York, which shortly will place a complete line of speed reducers on the market. Mr. Bassoff will have charge of development, design and production of the company's products and will continue as consulting engineer for the Sier-Bath Co.

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D. Clinton Grove, advertising manager of Blaw-Knox Co., Pittsburgh, has been elected president of the Pittsburgh Industrial Advertising council for the 1935 term.

Charles Kalbfus, advertising manager of the Elliott Co., Jeannette, Pa., has been elected vice president and A. E. Hohman, assistant advertising manager of Blaw-Knox Co., has been elected secretary-treasurer.

J. H. Waxman, Westinghouse Elec-

tric & Mfg. Co., East Pittsburgh, has been named director for the three-year term; C. H. Short, Pittsburgh Plate Glass Co., has been named a two-year director and L. S. Monroe, Copperweld Steel Co., Glassport, Pa., a one-year director.

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George A. Cooper has been appointed southern representative for the Chain Belt Co., Milwaukee. His headquarters will be at Dallas, Tex.

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W. J. Carroll has been appointed sales manager for the Klauer Mfg. Co., Dubuque, Iowa, in charge of organizing and promoting the sale of its line of corrugated metal culverts and rotary-type snow plows in Wisconsin and upper Michigan.

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Charles Oliver, vice president of the Oliver Iron & Steel Co., Pittsburgh, has been named a member of the Pittsburgh board of education, succeeding his father, the late David B. Oliver, who was a member of the board from its inception.

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C. E. Davies, since 1931 executive secretary of the American Society of Mechanical Engineers, New York, has been appointed national secretary of the society for one year, succeeding the late Dr. Calvin W. Rice. Mr. Davies has been a member of the staff of the society since 1920.

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Fred S. Winfield, formerly associated with the industrial division of Timken Roller Bearing Co., Canton, O., the Detroit Ball Bearing Co., Detroit, and the Hoover Steel Ball Co., Ann Arbor, Mich., in sales engineering capacities, is now sales engineer with the field staff of Aluminum Industries Inc., Cincinnati, his headquarters being in Detroit.

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H. N. Pickett, for several years advertising manager of *Daily Metal Trade*, Cleveland, a Penton publication, has been named advertising manager of the Toncan Culvert Manufacturers' association, Youngstown, O., an organization engaged in the promotion of sales of Toncan iron corrupated pipe and sectional plate pipe manufactured by Republic Steel Corp.

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Hurlbut S. Jacoby, at one time contracting engineer for the McClintic-Marshall Corp., chief engineer for the Standard Steel Construction Co., district engineer for the Austin Co. and later vice president and sales manager of the H. K. Ferguson Co., Cleveland, builder, has been appointed director of industrial research at Ohio State university, Columbus, O. He is at present active with the NRA administration in Washington and will assume his new post Jan. 1.

Here and There In Industry

MINNEAPOLIS - HONEYWELL REGULATOR CO., Minneapolis, and Brown Instrument Co., Philadelphia, have been consolidated, the latter becoming a subsidiary of the former, with its existing organization, with Richard P. Brown as president. Stockholders of Brown Instrument Co. will receive stock in the Minneapolis company. Minneapolis-Honeywell manufactures temperature-control devices for household and air-conditioning use. Brown Instrument Co. manufactures measuring and controlling instruments for high temperatures in the industrial field.

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International Molybdenum Co., Porthill, Idaho, has installed a large ball mill and has about 40,000 tons of ore ready for milling. William Rideout is president and general manager.

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Champion Rivet Co., Cleveland, and East Chicago, Ind., has appointed Tanner & Co., Indianapolis, welding electrode distributor for Indiana and Root, Neal & Co., Buffalo, for western New York.

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Herbrand Co., Fremont, O., manufacturer of drop forgings, has added 380 men to its force, producing drop forgings for the automotive trade. The plant had been using only 20 men during recent weeks, awaiting specifications for 1935 cars.

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American District Steam Co., North Tonawanda, N. Y., has appointed Tomlinson-MacLachlan Inc., 1603 St. Clair avenue, Cleveland, its exclusive sales agent for Cleveland and northeastern Ohio for sale of its expansion joints, condensation meters, steam flow meters, water heaters, steam traps, reducing valves, vapor heating specialties steam line conduit, insulation and other equipment.

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Tubular Service Co., New York, which for some time has stocked mechanical tubing made by Steel & Tubes Inc., Cleveland, in its warehouses at New York, Philadelphia and Boston, has added stocks of Electrunite boiler tubes made by the same producer, in its warehouses at New York and Philadelphia. This gives Steel & Tubes two distributors of these boiler tubes in New York, the other being the J. B. Astell Co.

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Maintenance Engineering Corp., Houston, Tex., has been appointed exclusive sales and engineering representative for Wilson-Snyder Mfg. Corp., Pittsburgh, for sale of the latter's pumping equipment for refinery, pipeline and industrial service in the Gulf coast area. Wilson Supply Co., Houston, Tex., continues exclusive distributor of Wilson-Snyder slush pumps, oil country pumps and accessories for the production division of the oil industry in that territory.

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Tungsten carbide tool, die and specialty department of the Bissett Steel Co., Cleveland, has been reorganized and will be operated as a separate corporation under the name Tungsten Electric Corp., Bissett Steel Division. Manufacture and sales will be handled by the same personnel as before, with increases required by the broader scope of the new company. Executive offices and main plant will be in Cleveland. A branch manufacturing plant has been built at Chicago and is now in operation. Other branches will be built later. Bissett Steel Co. warehouse at Cincinnati will be used for the present as Cincinnati headquarters of the new corporation.

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United States Rubber Co., 1790 Broadway, New York, recently made a record in manufacture and shipment of conveyor belts from its plant at Passaic, N. J., to site of the Coulee dam in Washington. The belt weighed more than 110,000 pounds and was made for the Jeffrey Mfg. Co., Columbus, O., for use in connection with equipment furnished to Mason, Walsh, Atkinson, Kier Co., which has the excavation contract. In 17 days after the first order was received by telephone at Passaic a carload of 60-inch width belt nearly half a mile in length was manufactured, shipped and delivered at the damsite. An order for a carload of 48-inch and another for 60-inch belt followed and made equally good time. Some 11,000,000 cubic yards of material is to be moved in this operation.

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Timken Roller Bearing Co., Canton, O., has received an order from the American Car & Foundry Co., New York, for bearings and boxes for two high-speed streamlined four-car trains for Gulf, Mobile & Northern, now under construction at its shops at Berwick, Pa. The cars will not be articulated but will have two trucks, allowing flexibility and the use of additional cars when needed. The trains will be completely air conditioned and powered with diesel-electric motors. They will be used on the night run between New Orleans and Jackson, Tenn. Cars are of standard width.

Timken will also supply its roller bearings for the "Commodore Vanderbilt," the new streamlined, high-powered steam locomotive of the New York Central. The bearings will be applied to driving axles, engine truck and tender.

EDITORIAL

Subsidies Cannot Provide a Yardstick for Efficiency

PRESIDENT ROOSEVELT'S recent visit to TVA territory and his statement at Tupelo, Miss., to the effect that he hoped to see the southern power experiment extended into every section of the country have revived interest in the age-old problem of government competition with private enterprise.

The Tennessee Valley Authority was created by an act of the seventy-third congress, approved by the President on May 18, 1933. Months later the President established by executive order a number of government agencies to extend the scope of TVA into many lines of activity not clearly specified in the original act. One of these agencies is the Electric Home and Farm Authority, the certificate of incorporation of which states that it was established "to advance the general economic welfare of the nation by developing and fostering an increased use of electric power through the double reduction of the cost of electricity to the consumer and the cost of electric appliances." Another agency is the Tennessee Valley Associated Co-operatives Inc., the aim of which is to "go into the plans and methods of co-operative organization and to help to stabilize those which seem to be well organized and to have a proper function." According to a TVA bulletin, co-operatives planned for Norris, Tenn., include "a co-operative of egg producers, milk producers, a co-operative store and *perhaps later some small industries.*"

Operation of TVA Will Not Show True Cost Of Generating and Distributing Electricity

Curiously, the President's dream of a "more abundant life" for the inhabitants of the Tennesse valley is based upon the assumption that the requisites of comfortable living can be provided more economically under government ownership and control than through the established facilities of private enterprise. He must believe that this is true; otherwise, what excuse can be given for the "yardstick" principle which the President has reiterated on so many occasions? Obviously he expects that the TVA "yardstick" will show that the rates of privately operated public utilities are too high, or, to put it another way, he hopes to demonstrate by the TVA experiment that electricity can be provided at lower cost to consumers.

Time alone will reveal the outcome, but already the value of TVA as a "yardstick" has been destroyed. The generating plants at Muscle Shoals were put on TVA books at a questionably low value; TVA pays a tax of 5 per cent on 4 mills per kilowatt-hour while private power companies are paying 15 to 20 per cent on 2 cents per kilowatt-hour; TVA is financed with public money at lower interest rates than are paid on private financing; overhead and interest during construction are not charged against TVA projects; TVA franks its bills, letters, advertising, etc., whereas the private company pays the full postal rates; and TVA pays on all freight hauled for building its projects not to exceed 66 2/3 per cent of the freight cost to a private company. These descrepancies, pointed out by Wendell L. Willkie, president of the Commonwealth & Southern Corp., show that if the TVA is a "yardstick," it has the characteristics of rubber, and has no merit in demonstrating what the real cost of electric power should be. TVA would be better justified as an outright subsidy than as a "yardstick."

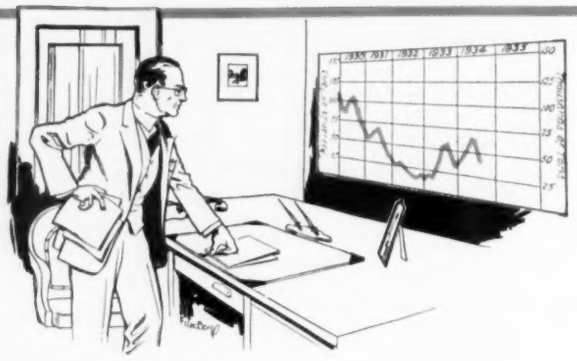
Why Not Apply "Yardstick" of Efficiency of Private Enterprise to Government Agencies?

Competition in private enterprise makes for an efficiency which cannot be matched by government effort. Anyone who questions this statement will do well to read "The Three Little Meters and the Telephone" by A. J. Wager and R. A. Aschenbrener. It is the story of Wattso, your electric meter; Gaso, your gas meter; Washo, your water meter; and your telephone. After reading it, you will be more convinced than ever that you get more for your dollar from the privately supplied gas, electricity and telephone than from the publicly supplied water. As a simple experiment, figure out what you are paying for privately furnished gas and municipally furnished water for your home. (This writer is amazed to find that he is paying $1.70 per 1000 cubic feet of water against only $0.595 per 1000 cubic feet of natural gas).

Many persons will agree with the President that a yardstick of values is badly needed. We would suggest that the tape line of the efficiency of well managed private enterprise be applied to some of our municipal, state and federal agencies. Perhaps a test of this yardstick would show that the U. S. postoffice could be improved under private operation.

Today the threat of TVA is pointed toward public utility interests. Industry should be on the alert to see that it does not become tomorrow's target for government competition.

THE BUSINESS TREND



Business Advances Briskly Along Broad Front

INDUSTRY has quickened its pace appreciably in the past week. The rate of steelworks operations, after hovering around the 30 per cent mark for several weeks, now is several points above that figure. The automobile industry, touching the off-season low level in the last week of November, now is in its second week of sharply expanding activity.

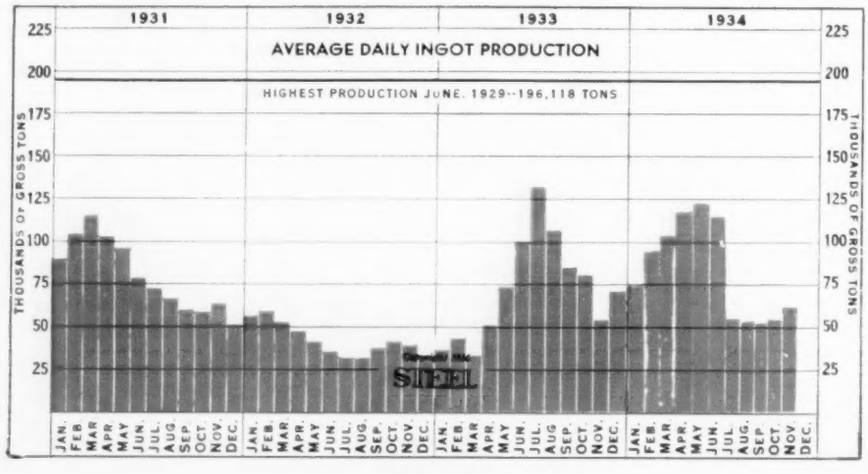
Concurrently, the reports on electric power output and revenue freight car loadings for the week ending Dec. 10 show encouraging rebounds from the recessions of the preceding week, which included Thanksgiving day. Power output leaped to 1,743,427,000 kilowatt-hours, the highest recorded since the week ended Dec. 20, 1930.

Additional evidence of improving business is found in the current announcements of a greater volume of inquiry for and award of machinery, equipment and supplies. The revival of moderate activity in these fields will not be reflected in statistics until some of the monthly reports for December appear in January.

While business men were scanning the reports of improved conditions, predictions for 1935 were forthcoming from two eminent figures in the field of banking and finance. Col. Leonard P. Ayres of the Cleveland Trust Co., whose annual forecasts have won nation-wide attention, declared his belief that 1935 probably will be "another year of depression during which the physical volume of industrial production will not be as great in any month as it was in July of 1933 or as small as it was in March of 1933." Since the adjusted index of industrial production was 100 in July and 60 in March of 1933, it would be possible to have a very good year or a decidedly poor year and still be within the bounds of the forecast.

Dawes, Former RFC Head, Studies Charts and Predicts Spurt in Durable Goods Next July

Charles G. Dawes, basing his remarks upon studies of charts of the depressions following the crashes of 1873, 1893 and 1929, "suggests" that "not later than June or July of next year should be the beginning of the great sustained demand for durable goods due to the accumulation for five years of postponed demand."



1934

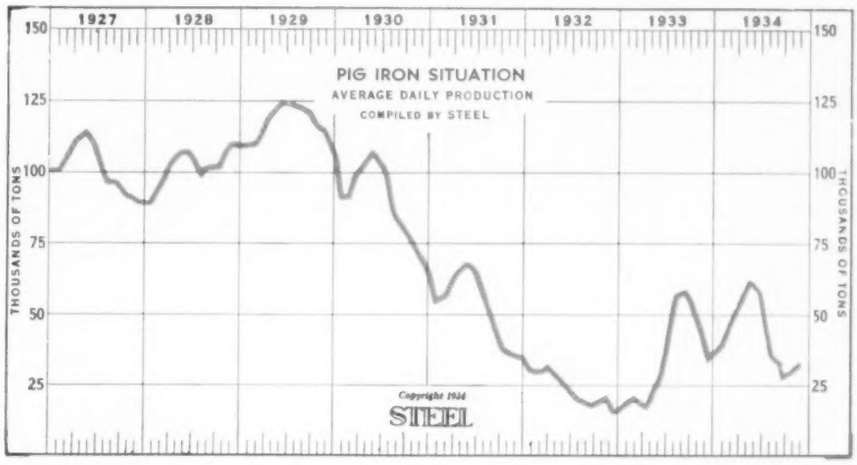
	Tons
Nov.	61,117
Oct.	54,146
Sept.	50,065
Aug.	50,495
July	58,903

1933

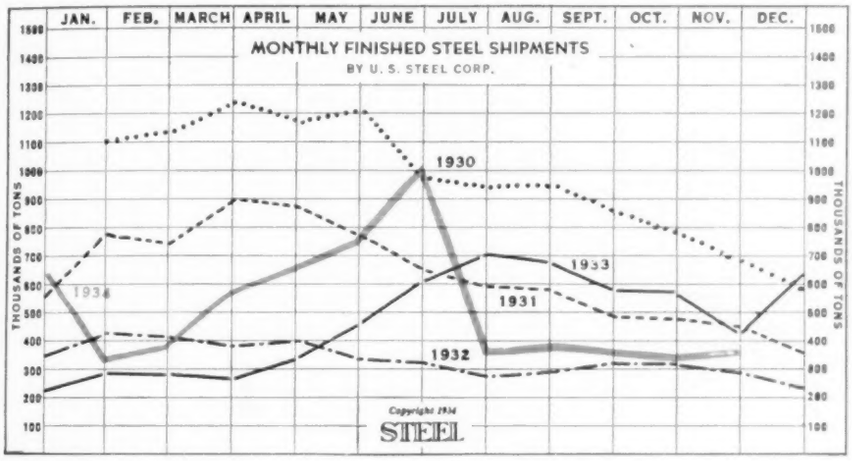
	Tons
Nov.	58,507
Oct.	80,188
Sept.	87,811
Aug.	106,058
July	126,734

November Iron Production Up Moderately

Average daily output of coke pig iron in November was 31,930 gross tons, which compared with the 30,689 tons of October, was a gain of 1241 tons, or 4.05 per cent. This was the highest rate since August with 34,199 tons per day. The rate in September was 29,969 tons, and in November, 1933, 36,124 tons. Pig iron produced in the United States in 11 months of the year has amounted to 14,949,673 tons, an increase of 24 per cent over the 12,029,571 tons produced in the corresponding period of 1933.



	Tons
November, 1934	31,930
October, 1934	30,689
November, 1933	36,124



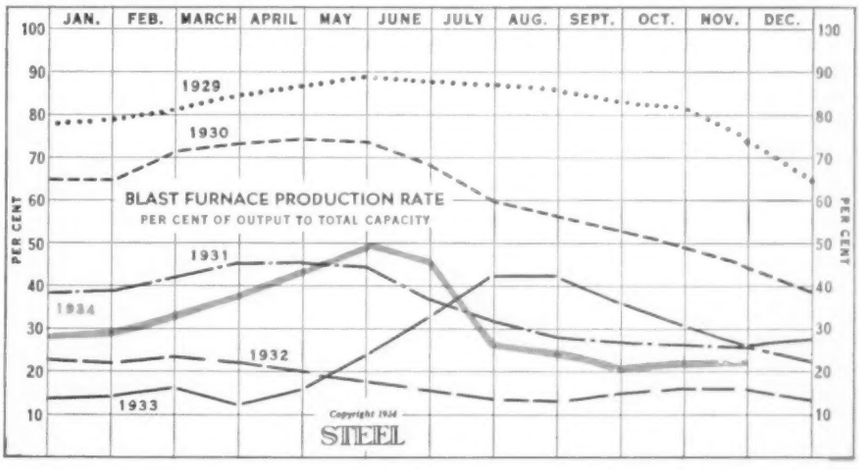
Finished Steel Shipments Gain Slightly in November

Shipments of finished steel products by the United States Steel Corp. in November were 366,119 tons. This is an increase of 22,157 tons over the preceding month and compares with 430,358 tons in November, 1933. During the 11 months ended November, 1934, shipments by the Corporation totaled 5,507,243 tons, compared with 5,160,313 tons in the 11 months ended Nov. 30 last year.

	Tons
November, 1934	366,119
October, 1934	343,962
November, 1933	430,358

60 Blast Furnaces Active On November 30

Although total output of pig iron increased 6553 tons in November, the total of active blast furnaces dropped from 65 to 60 for the eleventh month. Relating production to capacity, the rate of output for November was 22.8 per cent. This compares with 22.1 per cent in October, 21.5 per cent in September and 24.5 per cent in August, and 26.2 in November a year ago. Operations reached their peak in 1934 at 47.5 per cent in May.



	Per Cent
November, 1934	22.8
October, 1934	22.1
November, 1933	26.2

New 3-High Roughing Mill Unit Designed to Roll 1800 Pairs in 8 Hours

WHAT is claimed to be the fastest mill ever built for roughing sheet bars has been shipped to Jamshedpur, India, for installation at the plant of the Tata Iron & Steel Co. The minimum possible rolling cycle in accordance with the original calculations and specifications, for roughing a pair of 12-inch sheet bars at 16.5 pounds per lineal foot in five passes to 70 inches long, is 14.468 seconds. The mill is expected to average one pair every 16 seconds or 1800 pairs per 8-hour shift for a week. This is equivalent to 82.87 gross tons of bar weight per 8 hours using sheet bars 37½ inches long weighing 103.125 pounds per pair.

Details of the 3-high mill, feeder and catcher tables and the control were worked out carefully over a period of months between the Mackintosh-Hemphill Co., Pittsburgh, as builder of the mill; the Wean Engineering Co., Warren, O., as builder of the mill tables; and, the Clark Controller Co., Cleveland, as builder of the mill controls; all of whom cooperated fully with the Perin Engineering Co., New York in working out the details in accordance with specifications.

Upon completion of the mill, tables and control, the complete unit was assembled on the erection floor of the machine shop division of the Mackintosh-Hemphill Co., Wooster, O. and its operation demonstrated to approximately 150 sheet mill executives in this country who were guests of the four previously mentioned companies.

Control equipment mounted in a steel cabinet at floor level was available for close inspection as was the mechanism for operating the front and rear tables serving the mill. During the demonstration the middle roll was changed without interfering with the operations of the top and bottom rolls. This was accomplished by means of a C-hook suspended from the crane with a delay of only six minutes.

A buffet lunch was served at noon, followed by the presentation of moving pictures of the Tata plant. Before describing the new 3-high roughing mill unit the reader may be interested in facts concerning the sheet mill division of the Tata company, as explained by Frank A. Estep, vice president, Perin Engineering Co., New York.

The Tata Iron & Steel Co., producing rails, heavy structurals, light structurals, plates and merchant bars, entered into the manufacture of sheets in December, 1924. The sheet mill was laid out and equipped in accordance with American mills as of about 1918, consisting of a single train of hot and cold rolls driven with a 1500-horsepower motor, the mills being 2-high and ranging 30x38 to 30x66 inches. The furnaces are continuous for pairs and in-and-out for packs, stoker fired. The mills are hand operated by Indian crews under American or English supervising foremen. A fair percentage of the product is annealed and shipped as black sheets while the major percentage is galvanized, a large part of the latter being corrugated.

Each of these six mills has its own rougher. Most of the output ranges from 30x84 to 36x120 inches, the average gage being about 23.5. The mills produce approximately 10 gross tons of sheared sheets per mill per 8 hour shift.

India always has been a good market for galvanized sheets, particularly corrugated sheets. During the years 1928-1929 the average importation of galvanized sheets was approximately 330,000 gross tons per annum at which time the Tata Iron & Steel Co. was making about 35,000 gross tons per annum. Beginning with the world depression the importations came down rapidly because of the serious condition of the jute business. However, in 1932, they were still substantial into the territory which the Tata company readily could supply.

Early in 1932 serious consideration was given to the increase in pro-

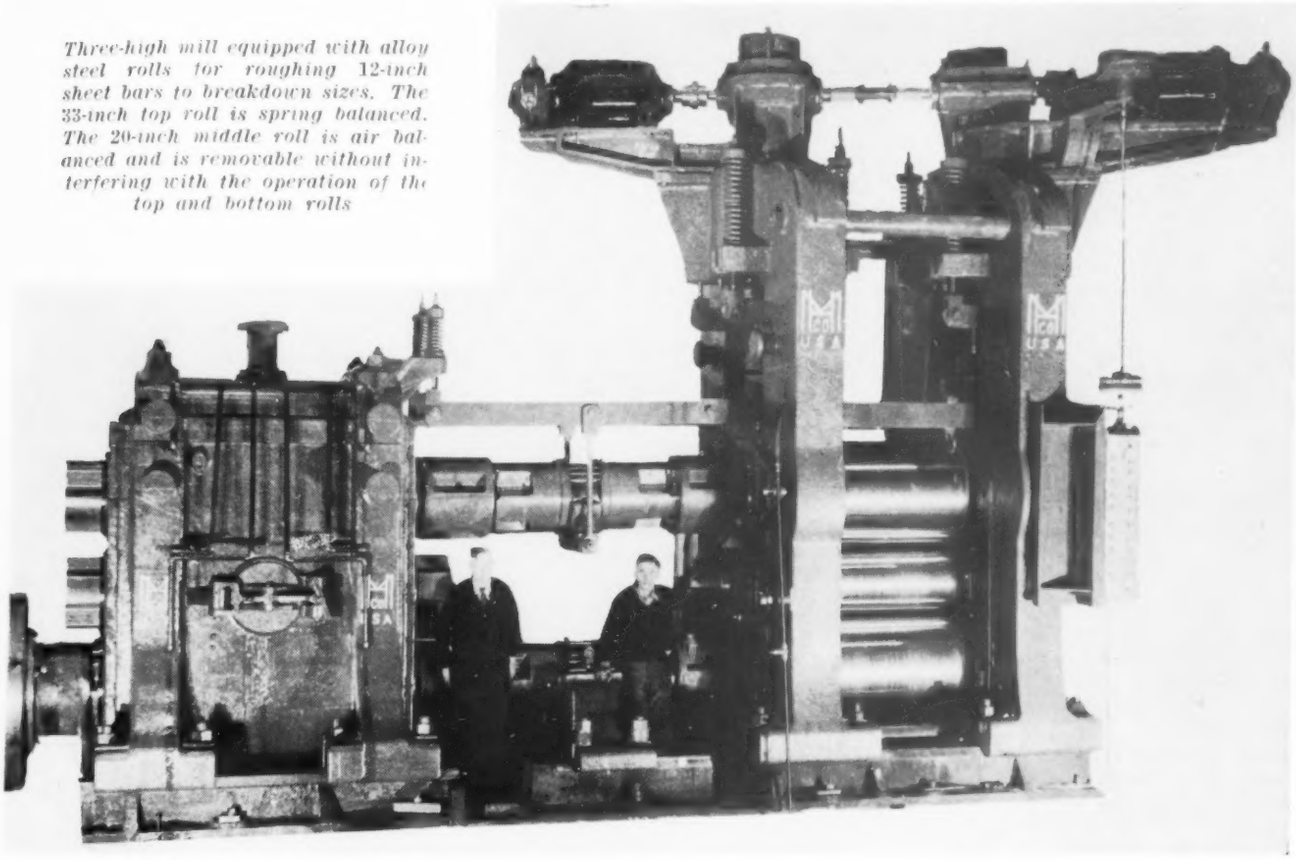
duction of sheets at the Tata works. An increase by the lowest conversion cost method would call for an increased production of approximately 100,000 tons per year. However, a close study upon the ground by the consulting engineers showed that there was an immediate market in addition to that then produced by Tata, of only 25,000 to 50,000 tons per year. It therefore was decided to adopt a plan of expansion of approximately 25,000 tons per annum each, the first unit to be installed immediately and the second unit as soon as market conditions warranted.

mill building, starting with the 2300-horsepower motor mentioned and a new gear reducer, was to consist of one previously 2-high finisher with mechanical feeder and catcher tables and two 2-high hand roughers to be served by double width continuous furnaces. The additional equipment consisted of conveyors, a mechanical doubler, a cooling conveyor, and squaring shears, as well as additional buildings, cranes, pickling and galvanizing equipment and a new warehouse to take care of the increased product.

Practically all the equipment was

during 1934 the mill has rolled part or all of some weeks on 30-inch wide stock and also during other weeks has rolled 26 gage instead of 24 gage. During the week ending Feb. 10, 1934 the mill on 34¾x36-inch wide sheets by 24 gage averaged 49.5 gross tons for 16 shifts including a maximum shift of 63.45 gross tons on 34¾x108-inch stock. For the week ending Nov. 17, 1934 the mill averaged 41.2 gross ton per shift on 30-inch wide sheets.

By October, 1933 it was evident that consistent maximum production on No. 1 unit was handicapped by the



Three-high mill equipped with alloy steel rolls for roughing 12-inch sheet bars to breakdown sizes. The 33-inch top roll is spring balanced. The 20-inch middle roll is air balanced and is removable without interfering with the operation of the top and bottom rolls

Sheet bars are rolled on a Morgan continuous sheet bar and billet mill consisting of six stands of 24-inch and six stands of 18-inch rolls. In connection with the installation of the first sheet mill extension, it was decided to increase the power on these mills. This was done by taking the 2300-horsepower motor from the 24-inch mill to the sheet mill; transferring the 4000-horsepower motor from the 18-inch mill to the 24-inch mill; and installing a 7500-horsepower 93.75 revolution per minute synchronous motor to drive the 18-inch mill. By strengthening up the 18-inch mill the Tata company can roll 16-inch and possibly 20-inch wide sheet bars.

Sheet mill extension No. 1, located in the north end of the existing sheet

bought in the United States and in 6½ months from the decision to proceed, the roughing mills were started; the finisher started one week later. The entire hot mill unit started March 6, 1933 and has continued to operate without stoppage to date.

When the decision was made to install the addition it was guaranteed that the No. 1 unit, on 36x96-inch by 24 gage stock would average 30 gross tons of sheared sheets per 8-hour shift. After the mill had been in operation 8 weeks, the guarantee was raised to an average of 37.5 tons. And from March 6, 1933 to March 31, 1934 inclusive, the mill averaged 38.15 gross tons per shift; from April 1, 1934 up to and including Nov. 17, 1934 the mill has averaged 41.4 gross ton. Furthermore

55-foot pack furnace and by the two hand roughers which were inadequate to furnish the finishing mill with sufficient roughed pairs. The latter difficulty was overcome to a certain extent by installing between the two roughing mills a steel roughing on which all bars received one pass and some two passes before swinging to the two chilled roughers.

Extension No. 1, consisting of the 2-high finisher and three hand roughers and one pair of cold rolls, has been driven to date with the 2300-horsepower motor removed from the 24-inch continuous sheet bar and billet mill. Believing that this motor might not carry extension No. 2 in addition to the load from extenson No. 1, it was decided to install a 3000-horsepower motor on the

Schedule of Passes Using 16½-Pound Bars

(Size of bar, 37½ x 12 x 0.396 inches)

Pass No.	Bar thickness, inch	Reduction, per cent	Bar length, inches	Spacing between bar, inches	Time—one bar in rolls, seconds	Time—two bars in rolls, seconds	Time—two bars in rolls, plus time for gap between bars, seconds
0	0.396	.....	12	.....	.....	.....	.....
1	0.235	40.7	20	17.5	0.394	0.788	1.133
2	0.150	36.2	31.5	6	0.622	0.622	1.362
			MATCH				
0	0.300	.....	31.5	.....	.....	.....	.....
3	0.205	31.7	46.4	.....	0.917	.....	0.917
4	0.160	22.0	59.4	.....	1.173	.....	1.173
5	0.136	15.0	70.0	.....	1.383	.....	1.383
Totals					4.489	.....	5.968

ESTIMATED TIME INTERVALS

From delivery tail, pass No.	To enter pass No.	Seconds
5	1	1.5
1	2	1.5
2	3	2.0
3	4	1.5
4	5	2.0
Total		8.5

Grand total, minimum cycle, seconds	14.468
Absolute maximum number pairs	1990
Average No. pairs anticipated	1800
Average time cycle for 1800 pair, seconds	16.0
Roll efficiency at 14.468 second cycle, per cent	31.05
Roll efficiency at 16.0 second cycle, per cent	28.05
Operating efficiency at 16.0 second cycle, per cent	90.4

existing foundation of the 2300-horsepower unit, using the same gear drive.

Extension No. 2, insofar as the hot mill is concerned, will consist of one 2-high finisher with automatic feeder and catcher tables fed by a 75-foot double chamber continuous furnace; and one 3-high rougher operated as a wet mill, fed by a single width continuous furnace 100 feet long. Both heating furnaces, furnished by Flinn & Dreffein Co., Chicago, will be fired with coke oven gas. A mechanical doubler, the necessary conveyors, cooling conveyor, and two squaring shears also will be provided. Additional buildings and cranes, a new bar shear, an independently driven cold roll train, additional equipment for pickling and galvanizing, and a larger warehouse will be included.

Embodies Many Features

A particularly new and interesting item in connection with extension No. 2 is the specially designed and equipped 3-high mill mentioned at the beginning of this article for roughing 12-inch bars in 5 passes to gages from approximately 15 maximum to 16 minimum. The mill with its reduction gear set was built by the Mackintosh-Hemphill Co., Pittsburgh. A careful analytical study extending over several months was made of various 3-high roughing mills in the United States before the decision was reached as to exactly how this particular 3-high roughing mill would be designed and equipped. The mill, with its tables and control as built, embodies many special features which, based upon the judgment of the consulting engineers, were justified in order to rough at an extremely high sustained rate of production per shift.

The rolls are of special molybdenum alloy steel and operate at 29.3 revolutions per minute. Top and bottom rolls are 33 inches diameter and the middle roll 20 inches diameter, all 52 inches long. These dimensions are for new rolls. Clearances are sufficient to operate with minimum diameter of rolls in the mill of 29½ inches for the top and bottom and 17 inches for the middle.

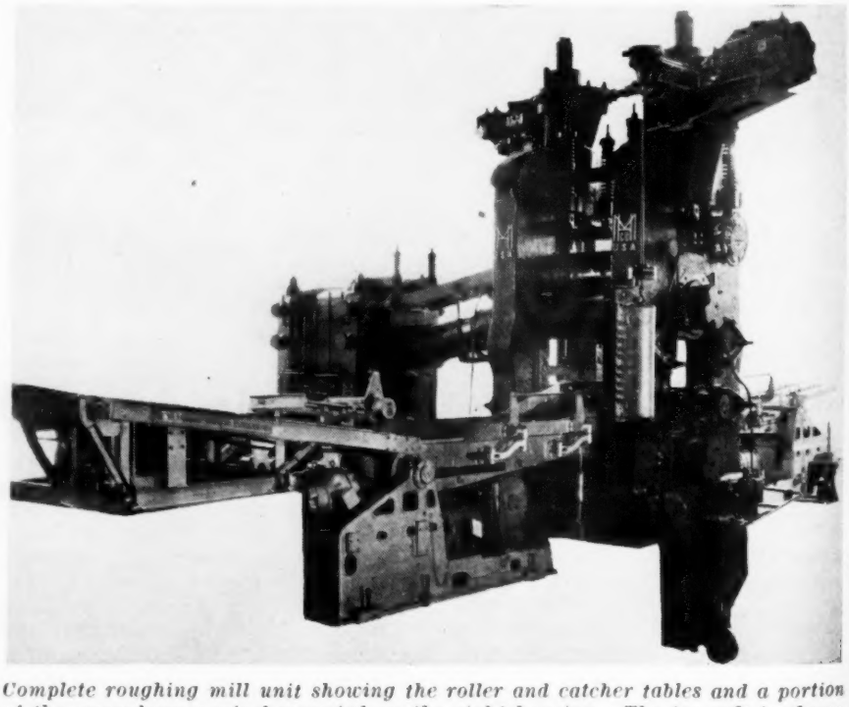
Spring Balance Used

The top roll, which is spring balanced and always in contact with the screws, is driven positively through a set of 3-high pinions, 26 inches diameter and 32 inches face.

The middle roll is air-balanced, actuated up and down by the raising and lowering of the catcher table and is held in positive alignment with roller bearings made by Messinger Bearings Inc., Philadelphia. It can be operated in a vertical plane or can be shimmed either front or back at will.

The middle roll is removable with the top and bottom rolls running when 6 inches above the bottom roll and 6 inches below the top roll, when all rolls are new. The middle unit will be withdrawn complete with roller bearings, roller bearing chucks and back cross bar and stripper guide by means of a specially-designed welded steel C-shaped hook. The latter was built by William B. Pollock Co., Youngstown, O.

Both the main and side bearings



Complete roughing mill unit showing the roller and catcher tables and a portion of the screwdown control mounted on the right housing. The top roll is shown in its maximum elevated position

for the top and bottom rolls, and the carrier bearings for the top roll are of the fabric type and were furnished by Joseph T. Ryerson & Son, Inc., Chicago. Water will be used as the lubricant.

The screwdown drive consists of two Westinghouse 15-horsepower mill type direct-current motors, operating in series on the downward movement and in parallel on the upward movement. In order to give access to the mill with the "C" hook when changing the middle roll, it was necessary to locate the screwdown motors angularly, that is, one on the front side and one on the rear side of the mill.

The screwdown is of the preset type, positively driven from the screwdown motors. The control is such that the screwdown is made automatic for the various passes by the pushing of a button by the operator for each pass. With this particular feature and others in connection with the tables, it is expected that the mill's cycle of operation will be the fastest that possibly could be attained. Particular attention was given to the speed on the upward movement after the completion of pass No. 5 preparatory to entering the first bar on pass No. 1.

Control Is Semiautomatic

The tables, another special feature of the roughing mill as a unit, were built by the Wean Engineering Co., Warren, O. The catchers table is of the tilting type with a combination of manual and automatic control and three hand-operated mechanical stops. The control of this table deliberately was made semiautomatic, entailing an operator, in preference to any full automatic control by flag switch, photoelectric cell and other mechanism, investigation having proved that faster operation of this table could be had by semiautomatic control than by any other scheme.

The front table is stationary and carries two sets of chains; one an ordinary set for feeding packs into the mill on Nos. 3 and 5 passes; the other set carries two dogs and a special safety stop each, for feeding the bars into the mill on pass No. 1. The front table is equipped with three stops, two of which are of the rotating type operated with solenoid motors; the other is of the knock-down type. The solenoid operated stop nearest the mill is stationary in location relative to the mill, while the other is adjustable for different lengths in order to match and reenter in the minimum time after delivery from pass No. 2. The knock-down stop, located farthest from the mill, also is adjustable in position for the minimum time in rematching the tail of the pair after delivery from pass No. 4. In entering the pair for both passes Nos. 2 and 4 the end of the pair hits the rotating stop next to the mill for front end matching. This stop then disappears, permitting the pack to enter the gap of the rolls.

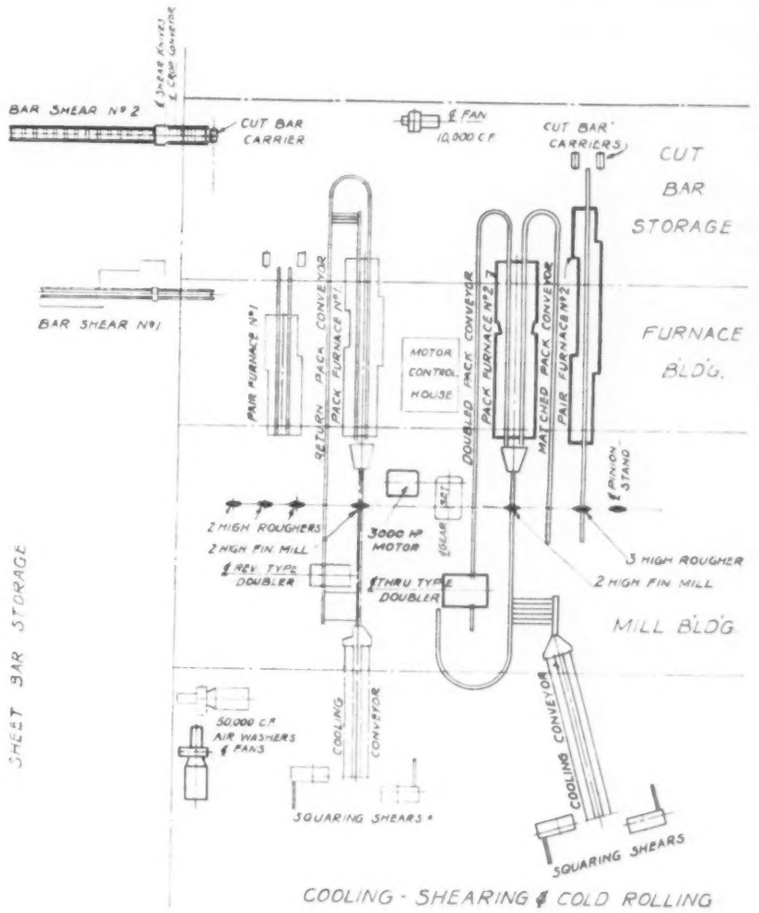
The opening of the furnace door, the starting of the furnace chains, and the delivery of a pair of bars down a driven conveyor to the front table, will be tied indefinitely and positively by electric control at some predetermined point in the cycle of five passes on the previous pair. The timing for the delivering of the second pair will be such that, after the tail end of the preceding pair has left the rolls on pass No. 5 and the operator has pushed his button to set the mill for pass No. 1, the time between the release of the pack on pass No. 5 and the entry of the first bar on pass No. 1 will be the absolute minimum.

The control of the screwdown, the preset arrangement for the various passes, the interlocking of the solenoid operated stops, and the delivery of the second pair from the furnace, is another most important and essential feature in connection with the fast operation of the unit as a whole. The controls were designed and built by the Clark Controller Co., Cleveland. Without a proper tie up of all of the control units the mill never would be able to function within the time limits which were specified.

The catchers table is interlocked with the chains on the rollers table so that under no circumstances can a pack or a pair be entered into the mill from the front when the back table is in its elevated position.

If through some mishap a pair is delivered from the furnace on to the front table before the entry of the preceding pair into pass No. 4, the pair will be stopped automatically on the front table just after it has left the furnace delivery conveyor. This is accomplished by an interlock.

In the delivery of a pair from the furnace on to the front table in accordance with the predetermined cycle, the bars immediately start to the mill. If by any chance the operator has not pushed the button to set the rolls for pass No. 1, the bars are carried up to within about 15 inches of the mill and then automatically brought to rest. They remain in this position until the operator has pushed the button, but cannot enter the mill until the rolls have reached the predetermined opening for pass No. 1.



Layout of the sheet mill units of the Tata Iron & Steel Co. No. I unit, shown in light lines, started production in March, 1933. No. II unit, shown in heavy lines, now is being installed

Low-Alloy High-Tensile Steels Provide Important Savings in Car Equipment

BY ALBERT F. STUEBING,
E. S. TAYLERSON
and
G. N. SCHRAMM

REDUCTION in weight of railroad freight and passenger car equipment, without any sacrifice in strength, has been made possible with the advent of the new low-alloy high-tensile steels. In addition to good physical characteristics, these steels show improved resistance to corrosion, without entailing the higher cost involved in use of the so-called stainless steels of the chrome-nickel and straight chromium grades. The accompanying article, describing properties and applications of certain low-alloy steels, is abstracted from a paper presented at the annual meeting of the American Society of Mechanical Engineers in New York, Dec. 3-7. Albert F. Stuebing is railroad mechanical engineer in the commercial office of the United States Steel Corp., New York; E. S. Taylerson is manager of the research laboratory of the American Sheet & Tin Plate Co., Pittsburgh; G. N. Schramm is associated with the corrosion research laboratory of the latter organization

EFFORTS of the railroads to reduce operating and maintenance costs have created a demand for steels embodying combinations of characteristics not heretofore available. The need for materials particularly adapted for use in freight cars found expression in some of the reports of the committee on car construction of the mechanical division of the American Railway association, and was emphasized further by the car manufacturers. To obtain the benefit of the suggestions of the car builders and railroads, a questionnaire asking for specifications or characteristics of the type of special steel that would be desirable for car equipment was sent to the principal users of car materials.

The replies to this questionnaire were almost unanimous in suggesting, first, a considerable increase in strength over low or intermediate carbon open-hearth steel combined with satisfactory forming qualities; second, increased resistance to corrosion; and third, a price which would not add greatly to the total cost of the complete car. Furthermore, it was considered desirable to have a steel meeting the three foregoing requirements which, when formed either hot or cold, would retain adequate physical properties.

Chrome-Copper-Silicon Steel

An analysis of different steels in production or in process of development indicated that one possessed significant qualities. That was a chromium-copper-silicon steel of low carbon content, which has since been produced commercially by subsidiaries of the United States Steel Corp. under the name of Cor-Ten. One advantage of this steel is the fact that the excellent physical properties are derived from the alloying elements and it is essentially not an air-hardening steel. Even rapid cooling from any temperature normally used in fabricating does not produce appreciable hardening. Cold working, however, will develop increased hardness with correspondingly higher yield point and ultimate strength.

The resistance to corrosion of this material, under ordinary conditions, was found to be considerably greater than any other available steels with the exception of the more costly high-chromium steels.

To afford a selection of material of high tensile strength, with a smaller price differential over ordinary open-hearth steel, it was decided to make available also, in forms suitable for car construction, two steels which previously had been used in forgings and rolled sections, namely, a medium manganese steel, now produced under the name of Man-Ten, and a structural silicon steel, which has been given the name Sil-Ten. These two steels are available with a small percentage of copper, in which case the resistance to atmospheric corrosion is on a par with copper-bearing open-hearth steel, but lower than that of Cor-Ten.

In an article dealing with low-alloy high-tensile steels, by Edwin F. Cone, and published in STEEL for Sept. 27, p. 41, considerable information was given on physical and chemical properties of Cor-Ten, Man-Ten and Sil-Ten steels, as compared with regular open-hearth steel. Weldability, corrosion resistance, impact values and other features of these steels also were summarized.

Experience in the production of Cor-Ten has shown that it can be rolled in general in forms commonly used in car building. The new A.R.A. center sill Z-bar section has been rolled successfully with the web reduced from the standard dimension of 13/32-inch to a thickness of 5/16-inch, effecting a decrease of 14 per cent in weight. Cor-Ten has also been pierced and rolled into seamless pipe.

In the development of Cor-Ten and other steels over a period of six years, more than 30,000 samples, comprising about 850 materials in 145 different laboratory and field tests, have been studied.

Increased Resistance Shown

Representative samples of Cor-Ten and other steels exposed to an industrial atmosphere for more than three years indicate that this steel under the conditions of the test has a resistance to atmospheric corrosion four to six times as great as good plain steel, depending on the quality of the plain steel with which it is compared. Some of the results obtained to date are shown graphically in Fig. 1. It is evident that the units in which corrosion is expressed may be converted readily into other units, such as average depth of penetration. The values remain the same, relatively, regardless of the method of interpreting the data.

The corrosion-time relationship of steel is not linear and it is not logical, therefore, to assume that the rate of corrosion of steel is the same throughout its period of service. This relationship, which the writers believe has not been pointed out heretofore, has been verified by a study of the curves of hundreds of different kinds of iron and steel.

It will be seen that the period of usefulness of a structure cannot be anticipated from a single set of corrosion observations on samples of the steel used in the structure. It is essential that designers and engineers know the *shape* of the curve representing the corrosion-time relationship of the material which has been selected for the structure.

The slow, rapidly decreasing rate of corrosion of Cor-Ten in the atmosphere results in a smooth, evenly corroded surface. The coating, or rust film, that forms is harder and much more adherent than that which forms on ordinary steels. Severe abrasive action is necessary to remove this dense coating, and after it has been removed the base is found to have been corroded uniformly. This uniformity of corrosion is a definite advantage in car structures.

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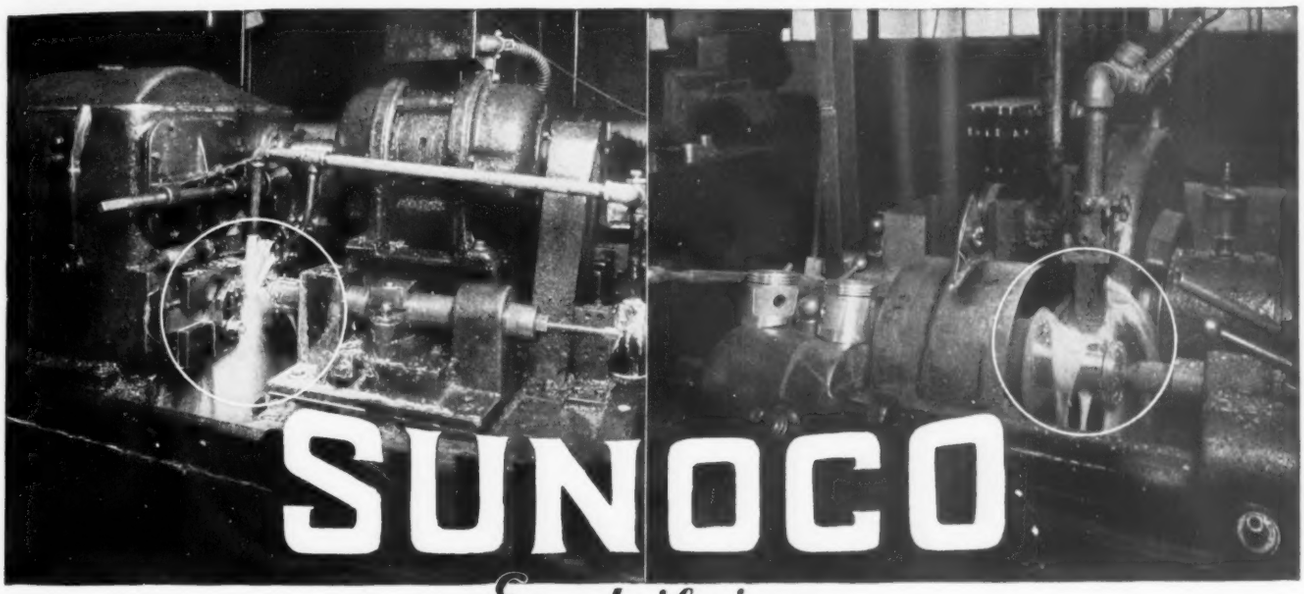

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The Operations Shown
(At left)
Courtesy of Diamond Screw Products Co., Detroit
Operation: Automatic nut blanking
Material: Cold rolled steel
Speed: 4000 r.p.m.
Production: 350 pieces per hour to 500
Lubricant: 1 part Sunoco to 15 parts water
(At right above)
Courtesy of Ray Day Piston Corp., Detroit
Operation: Finish grind aluminum piston
Machine: Landis Grinder
Wheel Spindle: 1300 r.p.m.
Work Spindle: 225 r.p.m.
Stock Removed: .015 inch
Coolant: 1 part Sunoco to 50 parts water

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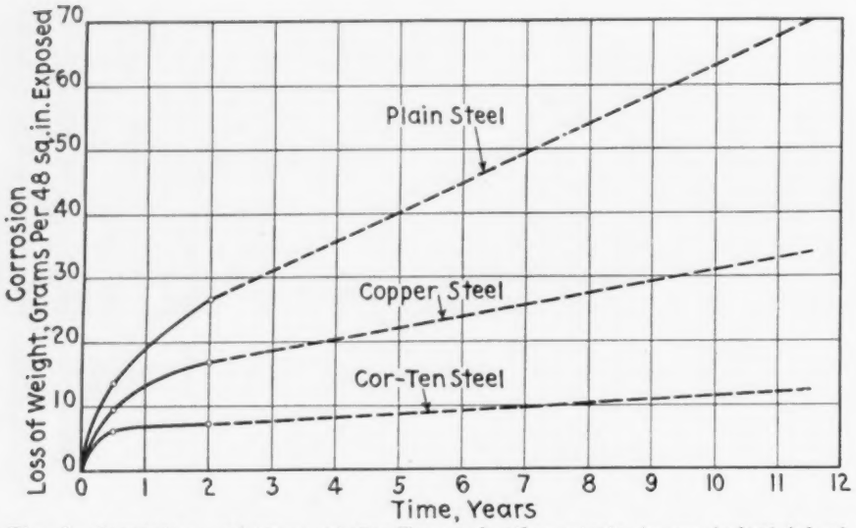

Fig. 1—Corrosion resistance of Cor-Ten and other steels in an industrial atmosphere, using annealed, pickled samples exposed on both sides. The extended lines, drawn straight, will become slightly parabolic in all three cases as further data are obtained

The increased interest of the railroads in light-weight freight car construction emphasized the need for a steel combining greater strength and increased durability. Since the most important corrosion problem of the railroads involves the durability of open-top cars, particular attention has been directed to the factors which cause rapid deterioration and to the manner in which Cor-Ten may be applied to this type of equipment. The most suitable way in which a steel may be tested, lacking long-time service tests, is by subjecting the material to selected *natural* corrosive conditions which approach in character those encountered in service.

With the thought that the water which seeps through coal in a coal mine is similar to that which seeps through coal in a freight car, samples of many steels were immersed in the acid water of an underground stream. After four months' immersion under these extremely corrosive conditions, Cor-Ten was found to be more than twice as resistant as copper steel and about three times as resistant as good plain steel. Contrary to usual experience, a smooth, adherent coating formed on this material. The metal was attacked uniformly; there were no deep pits, furrows or holes.

Corrosion Mainly Atmospheric

The corrosion of steel cars by coal depends largely on the kind of coal and the length of time coal is stored in the cars, but the corrosion of steel cars in coal service or regular service depends largely on the quality of the steel used in the cars with respect to its resistance to atmospheric corrosion, because cars in normal service are exposed to atmospheric corrosion throughout more than half their normal service life. Careful studies indicate that about 70 to 90 per cent of the corrosion of an average coal car is due to exposure to atmospheric conditions.

The superiority of Cor-Ten in the atmosphere, and in running water of an acid nature which has seeped through coal in a coal mine, indicates that this material should be far more satisfactory for use in cars to be placed in normal service than the steels used at present. Furthermore, since the scale formed on Cor-Ten is of a dense, hard nature and is difficult to remove, and since the characteristics of this steel make it more resistant to abrasion and denting, it is expected that when subjected to the combined corrosive and abrasive action of coal, sand, cinders, etc., it will prove more serviceable than ordinary open-hearth or copper steel.

Sprayed with Brine

Cor-Ten is resistant to other corrosive influences. As a means of determining its durability under the combined atmospheric and brine spray conditions which may exist in and around refrigerator cars, icing stations and right-of-way equipment, samples were compared by exposing sheets to an industrial atmosphere at an angle of 5 degrees from the horizontal and spraying them twice weekly with a 10 per cent salt solution. The spraying was applied to both sides of the specimens and was continued each time only long enough to wet the samples. This severe treatment was continued for a period of three months.

The quantitative data obtained under these conditions showed Cor-Ten to be twice as durable as copper steel and almost three times as good as open-hearth steel or iron. The rust on all of the ordinary steels had many raised patches which flaked severely during the test, revealing deep pits and holes. The rust that formed on Cor-Ten steel was much smoother and the base was corroded much more uniformly.

In proposing the application of these special steels in car construction one of the governing considerations was their adaptability for forming cold or hot. The physical properties of all three materials are such that these steels can be bent or pressed cold with only moderate and reasonable changes from the common practice in using low carbon steel. The technique of forming them is slightly changed from that of ordinary carbon steel, consisting principally of making provision for more liberal radius of bend, slightly increased die clearance, and more springback of the bend. These features produce no particular difficulties after the shop forces understand how the steels should be worked.

Standard Practice in Forming

It is natural to expect that these steels, having considerably higher physical properties, even though they retain good ductility, would be stiffer and, therefore, more difficult to bend or press cold. Both Cor-Ten and Man-Ten, however, have been formed satisfactorily as ordinarily required in carbuilding practice. It has been found that for cold flanging to an angle of 90 degrees the radius of the bend with sheets of either of these steels should be at least twice the thickness of the material to insure good results. If plates ¼-inch or more in thickness are to be pressed in the "as rolled" condition, either with or across the direction of rolling, the diameter of the fillet should be three times the thickness of the section. Experience has shown that normalized light plates of Cor-Ten pressed cold do not spring back any more than ordinary open-hearth steel pressed in the "as rolled" condition.

As regards hot forming operations Cor-Ten may be classed with low-carbon steel because it is essentially not an air-hardening steel. Man-Ten and Sil-Ten, however, have higher carbon content; therefore, normal care must be taken to insure that shop practices are not detrimental to these materials. In hot pressing Cor-Ten the most satisfactory results have been obtained at temperatures of 1500 to 1600 degrees Fahr. Man-Ten should be pressed at 1400 to 1500 degrees Fahr.

Cor-Ten rivets should be driven at temperatures between 1800 and 1900 degrees Fahr. At lower temperatures the material is stiffer and more difficult to drive than ordinary open-hearth steel.

Cor-Ten steel can be welded satisfactorily by using any one of several coated carbon steel electrodes. The strength of such welds, properly made, is substantially equal to that

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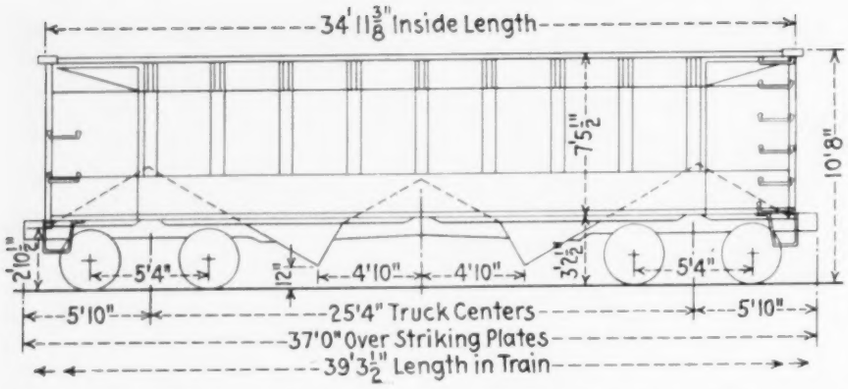


Fig. 2—Class N29 hopper car built for the Baltimore & Ohio railroad. Inside length is 34 feet 11⅜ inches; inside width, 10 feet 3⅛ inches; load limit, 137,000 pounds; capacity, level full, 2394 cubic feet; capacity, with heap, 2691 cubic feet; and weight, 32,000 pounds

of the parent metal, and ductility is ample. There is no evidence of electrolytic action or accelerated corrosion at the junction of the deposited metal and the parent metal. If it is desired to have the deposited metal of approximately the same composition as the Cor-Ten, this can be accomplished by using electrodes of special composition, which are now available.

Tests have been made to determine the power consumption and time required for punching, drilling and reaming Cor-Ten and Man-Ten steels in comparison with ordinary open-hearth steel. Plates of equal thickness were used in these tests and the same operations were performed on each material.

Requires More Power

The punching tests indicated that the costs for Cor-Ten and Man-Ten were practically the same as for ordinary open-hearth steel, the only possible variation being an increase of not over 25 per cent in power consumption and a similar increase in tool maintenance, with no change in time or labor cost.

Tests made by drilling ⅝-inch holes with high-speed drills in plates ½-inch thick indicate that the actual drilling speed for Man-Ten can be the same as for ordinary open-hearth steel, but for Cor-Ten the rate should be reduced about one-third from the maximum permissible with open-hearth steel, to insure satisfactory life of drills. In countersinking with manual feed there was no appreciable difference in time or power consumption between ordinary open-hearth steel and Cor-Ten, but with Man-Ten the time was 20 per cent less.

Reaming tests were conducted on ¼-inch plates of the same steels and consisted of enlarging punched holes from ⅝-inch to ¾-inch and from ¾-inch to 1⅛-inch with a portable electric motor driven reamer. The time required was the same for all three steels but the power consumption when reaming Cor-Ten and Man-Ten was approximately 30 per cent less than when reaming the open-hearth steel. This result was contrary to expectation and therefore was carefully checked by a second series of tests, which confirmed the original tests.

A probable explanation of the lower power consumption of the high-tensile steels was found in the action of the cutters. When reaming Cor-Ten and Man-Ten, the reamers cut a clean chip whereas the softer open-hearth steel seemed to deform and cause a frictional drag on the cutter.

The reaming tests demonstrated that Cor-Ten and Man-Ten can be reamed with no increase in labor cost as compared with open-hearth steel and with lower power consumption. The reamers used in the Man-Ten steel showed slight discoloration at the point, and it was thought that in production, reamers used in this material might require redressing at slightly shorter intervals.

Deductions drawn from these tests indicate that, because of the decreased weight and thickness of parts made of Cor-Ten or Man-Ten as compared with ordinary steel, there would be little, if any, increase in the total labor cost in building cars of the high-tensile steels.

Used on Three B. & O. Cars

The first cars constructed of Cor-Ten steel were built by the Baltimore & Ohio railroad in its Mt. Clare shops, Baltimore. These included a hopper car, railroad class N-29, with center and end hoppers; a hopper car, class N-30, with center hoppers only; and a box car, class M-48. The principal dimensions and weight of the first of these three cars are shown in Fig. 2.

All three designs have been provided with a cushion center sill separate from the underframe, with long travel draft gear interposed between the center sill and the car body. This construction was used by the engineers and designers of the railroad company with the thought that it would reduce the forces exerted on the car body in buffing and pulling. The severe impacts which occur in freight service cause the actual stresses in the car body to increase by an indeterminate amount over the calculated static stresses and this increase will be less as the end forces due to impact are decreased.

The trucks used on these cars have sideframes and bolsters of heat treated alloy steel castings and one-wear rolled steel wheels. Both hopper cars have bodies in which the sides function as the principal load-carrying members. The top chords are of ⅛-inch plate with a pressed reinforcement of $\frac{3}{16}$-inch plate. The side sill, which forms the bottom chord, is of ⅛-inch plate, pressed to a Z-section. The side sheets are $\frac{3}{32}$-inch thick, with corrugations ¾-inch deep, spaced on 3-inch centers. The cross ridge at the center line of the car is capped by a channel pressed from $\frac{5}{32}$-inch plate which extends down one gusset, over the cross bearer, and up the opposite gusset. The body bolster web plate is $\frac{3}{16}$-inch thick. The weight of the body of the class N-29 car is 18,480 pounds and of the class N-30 car 17,680 pounds. The weight of the body of the class M-48 box car is 24,380 pounds.

Experimental Cars Built

An experimental hopper car, designed to utilize the improved properties of Cor-Ten steel, has been built by the Pressed Steel Car Co., Pittsburgh. Each hopper chute is pressed from a single sheet, thereby eliminating the joints which ordinarily extend down the outside corners. This was done to avoid retention of lading and moisture, which might contribute to contact-corrosion. Man-Ten steel has been used in the brake rods and brake levers. The weight of this car is 30,000 pounds and of the body alone 17,800 pounds. The design of this car provides adequate cubic capacity to take full advantage of the allowable load limit in carrying coal at 52 pounds per cubic foot, thus securing a ratio of revenue load to gross weight of 81.9 per cent.

The Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., has built an experimental 40-ton refrigerator car with dry ice temperature control. The car has a steel frame patterned after the A. R. A. single sheathed box car. About half of the steel parts are of Man-Ten, 5330 pounds of this material replacing 7900 pounds of ordinary steel, effecting a reduction of weight of about 30 per cent.

The same builder is constructing

a 50-ton steel sheathed box car, modified in some details from the A. R. A. design. Cor-Ten steel is being substituted for ordinary open-hearth steel, with a saving of 4380 pounds or 25 per cent in the weight of the steel in the car body.

A number of important designs of passenger cars have been brought out in recent months incorporating high-tensile steels. Stainless steel of the 18-8 chrome-nickel grade has been used extensively in high-speed trains built by the Edward G. Budd Mfg. Co., Philadelphia, by its shot-welding process. The superior characteristics of this material are well known. The equipment in which it was used includes the Budd Micheline car, introduced in 1931; a self-propelled car for the Reading railroad; two-car trains for the Pennsylvania railroad, and the Texas & Pacific; a five-section articulated car for subway and elevated service on the lines of the Brooklyn-Manhattan Transit Corp.; and the Burlington Zephyr, with which everyone is familiar.

Tested in Street Cars

The first application of Cor-Ten steel in passenger car construction was made in the body of the model B street car designed under the direction of Dr. C. F. Hirshfeld for the Electric Railway Presidents' conference committee, and built by the Pullman Car & Mfg. Corp., Chicago. This was described in STEEL for Oct. 1, p. 29. The body is an interesting example of light weight unit construction formed of high-tensile steel by welding the frame members and sheathing into a rigid structure.

Another street car embodying principles developed by the conference committee was built by the J. G. Brill Co., Philadelphia, with a light weight body formed of sections pressed from carbon-vanadium steel.

The Baltimore & Ohio is having built by the American Car & Foundry Co., New York, two streamlined passenger trains, one of Cor-Ten and Man-Ten and the other with aluminum superstructure and Cor-Ten underframe. These trains will be equipped with cushion underframes and tight-lock couplers. Two streamlined trains built of Cor-Ten are also under construction for the Gulf, Mobile & Northern by the same builder.

The Standard Steel Car Co., subsidiary of the Pullman Car & Mfg. Corp., is building, at the Pullman Bradley works, 50 passenger coaches for through service for the New York, New Haven & Hartford, also ten passenger coaches for through service and 21 suburban coaches for the Boston & Maine. The bodies of these cars are built largely of Cor-Ten with Man-Ten in the center sills, draft sills and bolsters, thus marking the first application of high tensile steels in modern coach construction. A light weight self-propelled train to be built for the Illinois Central by the Pullman corporation at its Pullman works also will be constructed principally of Cor-Ten steel.

Sees Expanding Usage

In this discussion it has seemed advisable to consider in detail only those materials which have been applied extensively. The tendency which is apparent at this time, to adopt a wider range of materials for car construction, probably will lead to the use of other steels especially suited for particular service conditions. Among those which are being considered or undergoing tests are plykrome, a laminated steel having a stainless sheet on one side and ordinary carbon steel on the other; 4 to 6 per cent chromium steel; and 12 per cent chromium steel.

Recent developments indicate that future car design will seek to develop to the utmost the technical and economic possibilities of ordinary carbon and copper steel and will then utilize the low-alloy high-tensile steels, the higher alloy steels already mentioned, and perhaps additional materials, each in the application to which it is best adapted.

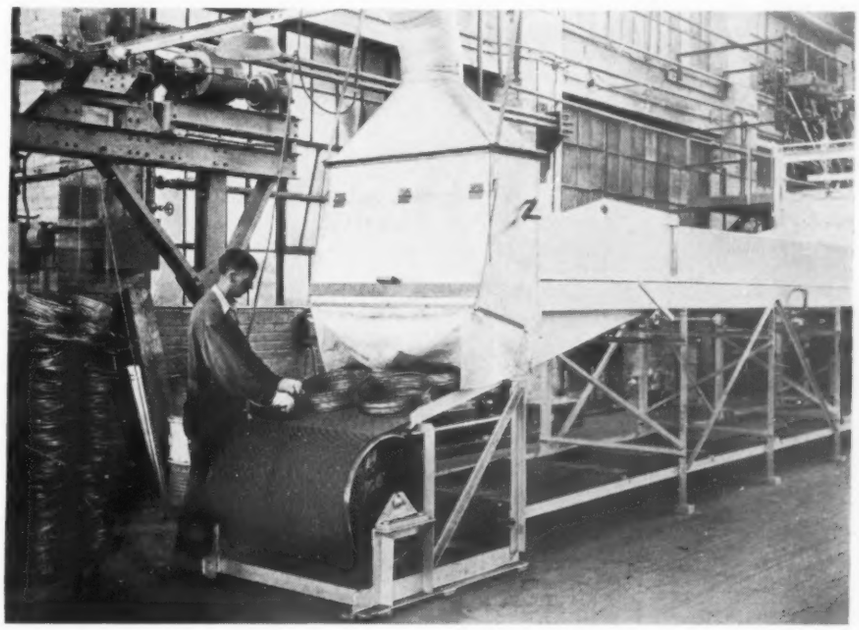
The authors desire to acknowledge assistance received in the preparation of this discussion from the various railroads and carbuilders mentioned, from their colleagues in the subsidiary manufacturing companies of the United States Steel Corp., and from J. A. Ralston, manager of the railroad research bureau of the subsidiary companies.

Portable Steel Fire Gun For Thawing and Heating

A new portable steel fire gun has been developed by the Aeroil Burner Co., West New York, N. J. It is intended as a combination thawing and heating torch and to serve for diversified purposes, such as drying wet spots, removing snow and ice from roofs, driveways, railroad tracks, burning weeds, heating asphalt, etc.

The new fire gun has a 4-gallon fuel and air tank made of corrugated, copper-bearing, galvanized and lead coated steel. The burner has a coil made of seamless steel tubing, and is equipped with a bronze regulating valve. Kerosene or stove oil may be used as fuel. The burner produces a flame up to 3 inches in diameter and 30 inches long, at a temperature of approximately 2000 degrees Fahr. Weight of the gun is 20 pounds and it is equipped with a snap shoulder strap.

Bright Surfaces



COPPER TUBING IS BRIGHT ANNEALED IN NEW ELECTRIC FURNACE: This furnace has halved annealing costs at the plant of the Wolverine Tube Co., Detroit; cost of electricity per pound of tubing annealed is $0.001. It produces a uniform product and, due the dry annealing feature, water spotting has been eliminated. Its flexibiity permits annealing of all of the company's products, straight and coiled tubing, finned tubes and formed pieces; formerly three furnaces were required for annealing. The furnace is continuous, of the mesh belt type and operates with an atmosphere controller which reforms a mixture of city gas and air. The complete unit was installed by the General Electric Co.

Anchoring of Machine Tool Affects Its Accuracy

A machine tool manufacturer who is particular about the precision of his work recently reported difficulty in maintaining settings on a machine in his shop. The work spindle of the machine was equipped with tapered roller bearings, and the manufacturer called upon the bearing maker, the Timken Roller Bearing Co., Canton, O., to analyze and correct the difficulty. The problem was unusual and an engineer went out to check over the situation with the tool builder's chief inspector.

The inspector demonstrated that when he tapped the spindle lightly with a lead hammer to center the work in the chuck the setting changed. The indicator gage was mounted on a heavy casting not connected with the machine. Checking the bearing failed to indicate any possible source of trouble.

Even though the machine weighed nearly 3000 pounds, the bearing engineer had the inspector tap the base of the machine just as he had tapped the spindle. It seemed ridiculous, but the indicator showed a change in the setting. Several trials proved that so delicate was the indicator and so accurate the spindle setting that even a light tap on the machine itself was sufficient to disturb the setting.

When the machine was fastened firmly to the floor, even though it seemed too massive to require anchoring, the trouble disappeared. Wedges alone used to line up a heavy machine are not always sufficient. This unusual incident illustrates the importance of investigating even remote possibilities when unexpected difficulties develop.

\$ \$ \$

Wrought Iron Plates and Rivets Used on Towboat

Use of wrought iron plates and iron rivets is being made in the construction of a new Ohio river towboat. These materials are employed in the hull construction due to the fact that stream pollution has caused considerable damage to the steel hulls of other floating equipment. The towboat being so equipped is the CHAMPION COAL, which Dravo Contracting Co. is building at its Neville Island shops for the Pittsburgh Coal Co., Pittsburgh.

\$ \$ \$

Alloy Cast Steels Require Effective Heat Treatment

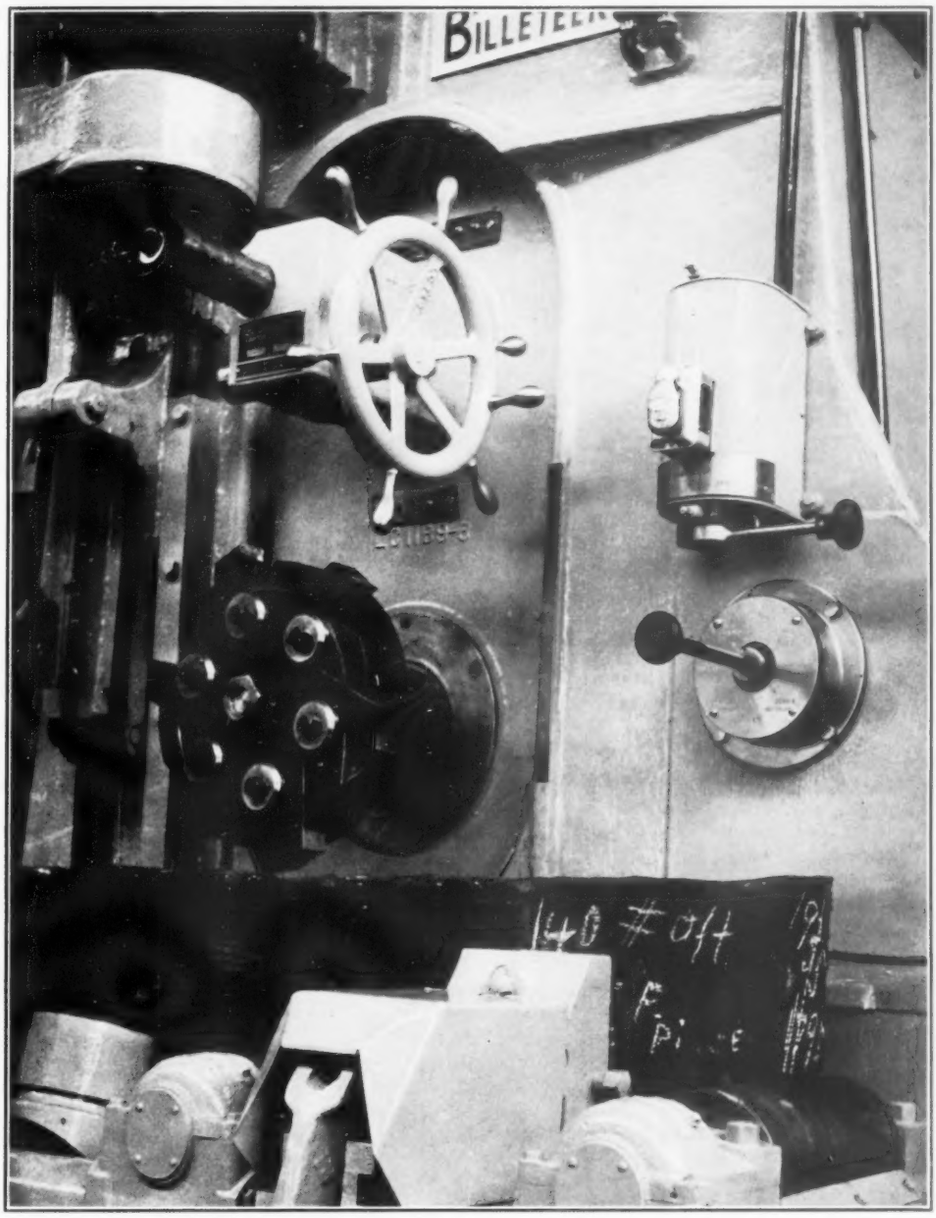
Cast steels of the intermediate manganese type, especially if they contain also small percentages of nickel, molybdenum or vanadium, possess excellent physical properties when either normalized and drawn or liquid quenched and drawn. They are characterized by excellent ductility values at the low and medium brinell hardness values and if the manganese content is maintained at approximately 1.25 per cent may be

18-8 for 5 and 10

ANOTHER STORE FRONT METALLIZED: A well-known name in the retail field, the S. S. Kresge Co. keeps pace with modern trends by rebuilding the front of its Canton, O., store, using 18-8 *stainless steel profusely. The modernization program, completed a few weeks ago, also involved an air conditioning system and new ceilings, requiring substantial amounts of sheet steel. The stainless steel front includes material for four marquees, window molding and sash, bands above display windows and other decorative work. Fabrication was done by Sioux Metal Products Co., Sioux City, Iowa, using steel supplied by Republic Steel Corp. The latter company also furnished copper-bearing steel sheets for the air conditioning system, as well as 8 tons of sheets for the new ceilings*

Billeteers

● LEAD IN CHIPPING ECONOMIES ●
● THAT'S WHY MAJOR COS. BUY THEM ●



The picture shows the main operating parts of the flexible BILLETEER. *Unified finger-tip controls* at right bring entire unit under easy and complete mastery of operator. Powerful cutting head can be spotted *instantly* over any defects with all work within full view. With 40 cutting cycles per minute and tools biting 3/8" deep when required—this unit will clean up the toughest of jobs at an *amazing rate*. Electrical drives for roll-table, chucking and turn-over units minimize lost motion and build up the *handsome returns* earned by this advanced machine.

Patented in U. S. and foreign countries

Steel Equipment Division

THE BONNOT CO.
CANTON, OHIO

quenched in either water or oil. These steels when properly heat treated have exceptionally good resistance to impact.

\$ \$ \$

Die Casting Nozzles of High-Chromium Cast Iron

Several manufacturers of aluminum die castings report that die casting machine nozzles made of a high-chromium cast iron give from three to five times the life obtained from nozzles made of the materials previously used. The chromium content may be varied from approximately 22 to 35 per cent, especially good results having been obtained with castings containing 34 per cent chromium, 1.60 to 1.80 per cent carbon and 1.60 to 1.80 per cent silicon.

\$ \$ \$

Cerium Addition Improves Aluminum Alloy Castings

Aluminum alloys containing 0.5 to 5.0 per cent copper; 0.5 to 3.0 per cent nickel; 0.1 to 2.5 per cent magnesium; 0.2 to 2.0 per cent iron; and 0.2 to 2.5 per cent silicon, are improved by the addition of up to 1.0 per cent cerium, according to a recent British patent. Cerium may be added as an alloy, metal or flux compound of 10 to 20 per cent cerium oxide, 30 to 40 per cent barium nitrate, and 40 to 60 per cent sodium chloride.

\$ \$ \$

Glass Tops for Tin Cans

Development of a glass top for tin cans with a glass-to-tin joint that in tests is stronger than the glass itself, has been developed by the Corning Glass Works, Corning, N. Y. It is claimed that if widely adopted the glass top for tin cans will have the advantage of enabling purchasers to see the contents plus the advantages to be derived in quicker canning methods.

Fracture Stress Lines Check Value of Light Tests

BY A. E. GIBSON, Vice President,
Wellman Engineering Co., Cleveland

USE of polarized light to show stress concentrations has come into fairly general acceptance the last few years, particularly in the design of welded equipment. In the study of welded design, to obtain maximum strength with minimum weight, the question of stress concentration is of vital importance. The hit-or-miss method of adding additional metal to obtain increased strength generally has been discarded for a more scientific investigation of just where abnormal stresses occur and of their minimization by eliminating sharp changes in contour where stresses build up.

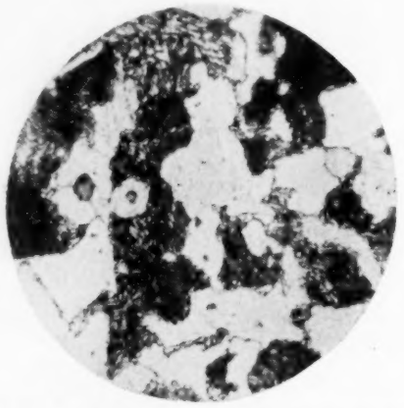


Fig. 3—Photomicrograph of fractured section showing clearly defined ferrite and pearlite grain structure of the forged steel. X500

An example of the results of this type of investigation and study is the work done by Lukenweld Inc., division of Lukens Steel Co., Coatesville, Pa., in the development of welded diesel engine crankcases. In this design investigation (STEEL, Aug. 28, Sept. 11, 1933), polarized light was used extensively, and the design of the internal cross bracing, a radical departure in crankcase construction, was the result of this study.

Recently a break occurred in the ram of a steam hammer. This particular ram had been in use for a long period of time, perhaps years. As sometimes happens, little attention was paid to its condition, and the keyway, to which was fastened the hammer die, became badly worn and distorted. With constant hammering, the bottom of the ram and the keyway became so worn that the key ceased to function, except to keep the die from completely separating from the ram. Eventually a crack was set up through the keyway and with continued service a section of the ram, as shown in Fig. 1, completely fractured.

Started at Keyway Corners

It is seldom that a piece of steel is subjected to continued severe reversal of stresses for so long that in fracturing, a permanent record of the intensity and direction of stress is recorded in the fracture. It will be seen in the illustration that the stress lines swing in long, sweeping curves from the sides of the keyways which were rounded in machining to eliminate the sharp corners. The metal above and between the sides of the keyways is smooth. The fracture started at the corners and eventually extended the width of the keyway. Evidently the ram held for a long time after this crack occurred, as is evidenced by the working of the metal upon itself.

A second crack also occurred some inches to the left of the keyway, long before complete failure. Note how the sweeping stress lines to the left changed direction sharply and turned almost at right angles to concentrate at the secondary crack.

This interesting fracture, with its record of concentrated stress, presented an interesting subject for investigation with polarized light. If these same concentrations of stress, these same directional stress lines could be produced with polarized light through a celluloid sample, it would substantiate the value of polarized light in determining the correctness of design to withstand constant reversal of severe stresses. Naturally, it would be impossible ex-

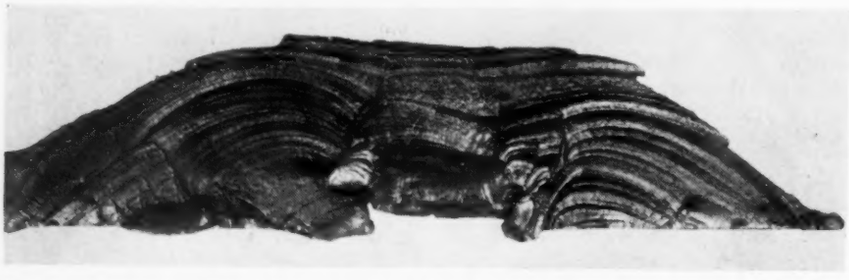


Fig. 1—Fracture of steam hammer ram showing stress lines permanently recorded in the metal. Notch at the bottom is the keyway in which the die was held

actly to reproduce the many stresses to which a steam hammer ram, and especially one with a battered base and keyway, is subjected in service. Tests with the celluloid piece in tension, bending and in combined tension and bending were made, some of the interesting results being shown in Figs. 3 and 4. It will be noted that in general the stress lines follow the same curves as in the fractured block. The stress concentration at the keyway corners is almost identical in the polarized light tests and in the fractured ram.

The intensity of polarized light stresses is shown in all colors of the spectrum, which naturally are incapable of true reproduction in a black and white illustration. Some of the colors photograph with the same intensity and some of the colors are not recorded at all. In Figs. 3 and 4 the directional lines are indicated clearly and show the same sweeping curves from the keyway to the right and left. The intense concentrations at the corners of the keyway are indicated, but these concentrations, which were in the range of green, blue, and violet, do not photograph distinctly. Actually, the stresses at the keyway are many times greater than the stresses sweeping across the upper part.

Those relying on the theory of polarized light stress distribution to guide their design here have proof of the theory in an actual fracture of a piece of 0.48 per cent carbon forged steel, subjected to intense and repeated stress. Photomicrograph of the fractured metal is shown, Fig. 2.

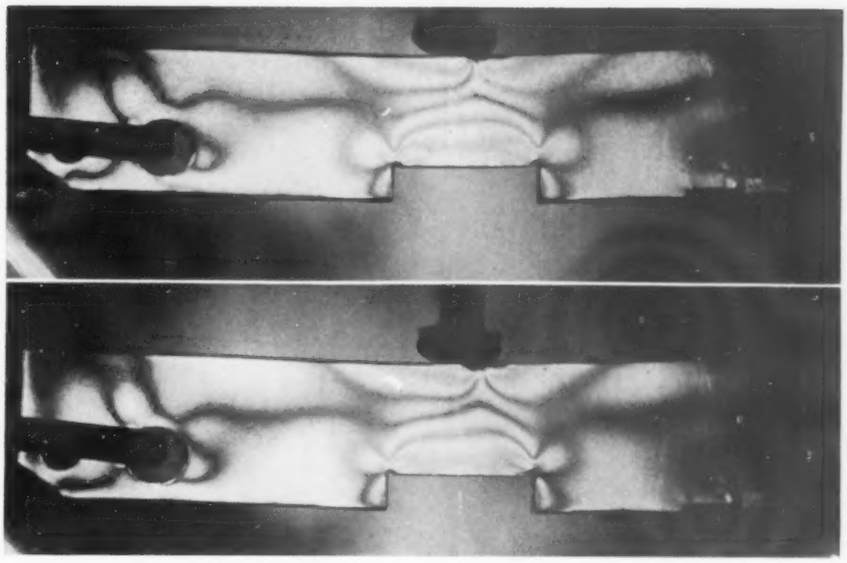


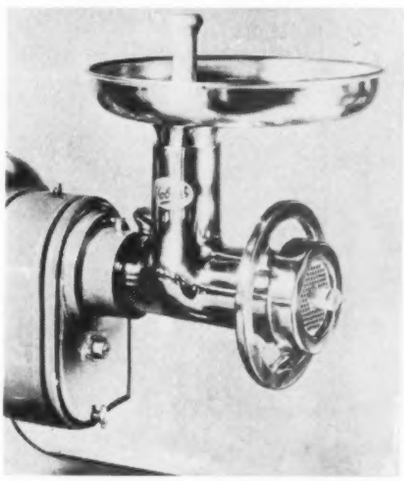
Fig. 3 (top)—Polarized light test on celluloid model, showing stress lines resulting from combined tension and bending stresses. Fig. 4 (bottom)—Similar test showing stress lines resulting from bending stress alone

Improved Meat Choppers Are Made of Chromium Plated Alloy Cast Iron

FOR the casting of meat chopper bodies, worms and rings, and also for spray heads, drain valve bodies and certain other miscellaneous parts of dish washers and potato peelers, the Hobart Mfg. Co., Troy, O., has standardized on nickel cast iron of the following analysis: Nickel 14 per cent; copper 5; chromium 1.25; manganese 1; total carbon 3.

"As far as physical qualities are concerned," says T. F. Rataiczak, chief engineer of this company, "castings made to the above analysis are quite a bit stronger than ordinary gray iron, and that they take a polish for chromium plating that cannot be obtained with the ordinary gray iron castings. We find this alloy resistant to corrosion and for this reason is well adapted for use in dish washing machines. While this alloy is more expensive than gray iron and is more difficult to machine than gray iron, we feel that it is a paying proposition for us to use it."

The accompaying illustration shows the chopping end of a meat chopper made by this company. Ring and body are of the alloy cast iron mentioned above, as is the hub which projects from the perforated plate. These parts are highly polished and chromium plated so that they practically are stainless.



Meat chopper made of nickel-copper-chromium-manganese alloy cast iron is stronger and takes superior polish and chromium plating. Drawn steel and stainless steel also are used in this chopper to give it good appearance through years of service

The feed pan is made of drawn steel, polished and plated with chromium direct on the steel to produce a satin finish which closely matches the finish on the chopper body.

The perforated plate on the discharge end of the meat chopper cylinder through which the cut meat is forced is made of cutlery grade stainless steel, while the knife that works against the inside of this perforated plate also is of stainless steel.

Through the use of these materials and methods the company has produced a meat chopper which retains its bright appearance over a period of years, as compared with the ordinary tinned cast iron meat chopper which had the habit of turning slightly green if not given proper attention and which, if scrubbed and polished daily, showed bare spots after the tin had worn through.

Two New Coatings Resist Acids and Alkalies

By employing a rubber rather than the conventional oil base, the Truscon Laboratories, Detroit, have developed a coating on which lime and other alkalies are said to have no effect. It also is unaffected by water. As a result, this new product, known at Alchemik concrete floor coating, is recommended for application to below grade concrete walls and interior floor surfaces such as basements. The only stipulation is that the concrete surface must be sufficiently dry to permit application of the coating. In addition to its alkali and water proof

Flat Wire

that contains that subtle something not to be measured by gauge or gadget

Behind the scenes of advanced methods and specialized modern machines are hundreds of Washburn craftsmen, many of whom have been at their duties since Washburn-Moen days. These highly skilled artisans, schooled to the highest standard of quality workmanship, overshadow mere mechanical methods in their contribution to Washburn quality.

Every inch of Washburn Flat Wire contains the keen interest of the true craftsman in handiwork well done.

The human element, fostered by engineering methods and quality materials, results in flat wire of uniform quality, unvarying thickness, free from defects on surfaces and edges, and straight throughout the coils.

Washburn Flat Wire is obtainable in cold-rolled high or low carbon steel, in widths from $\frac{1}{16}''$ to 4″ and thicknesses from .004 to .125 and in various finishes including tinned, galvanized and bronzed. Write for quotations.

WASHBURN WIRE CO., PHILLIPSDALE, R. I. **WASHBURN WIRE CO., Inc.,** NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS—STRIP—RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

features, the new coating is highly resistant to wear. It sticks to cement and concrete with great tenacity, giving a surface which is glossy, hard wearing, clean and dust free. It may be cleaned with any alkaline cleanser without dulling its luster. This new material also has been successfully used in some cases as a protective coating for steel exposed to alkaline contacts.

A product which resists acids also has been developed recently by the Truscon Laboratories. This is known as Alchemik acid resistant. It is a transparent liquid which may be brushed or sprayed on metal, wood, stone or concrete, and may be used on exteriors or interiors. At normal temperatures it is said to resist strong hydrochloric acid and solutions of sulphuric and nitric acids as well as ammonia and dilute caustic.

Fourth Monograph Covers Alloys of Iron and Copper

Alloys of Iron and Copper, by J. L. Gregg, Bethlehem Steel Co., and B. N. Dannoff, Carnegie Institute of Technology, issued by the iron alloys committee of the Engineering Foundation, New York; cloth, 454 pages, 6 & 9 inches, 110 tables, 182 illustrations; published by the McGraw-Hill Book Co., New York; supplied by STEEL, Cleveland, for $5, plus 15 cents for postage; and in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This volume, the fourth of the alloys of iron monographs, is the first complete summary and critical appraisal of the world's research on the alloys of iron and copper, and on the effect of copper on steel and cast iron.

For the practical steel man, whether metallurgist, superintendent, melter, foundryman or engineer, there is a comprehensive discussion of the manufacture, properties, and uses of steels and cast irons containing copper as an important alloy, including the important copper-bearing, corrosion-resistant materials.

Also included is a correlation of research work on the binary iron-copper alloys and on ternary systems of iron, copper, and a third element. Recent interesting developments in precipitation hardening of copper steels are reviewed and summarized at length.

Corrosion resistance of low-copper steel, now extensively used for sheet and structural members, and a comparison of the value of this steel with other low-cost corrosion-resistant materials, are other subjects covered.

Copper has been used as an alloy element in steel for about 20 years. Before that time it was known to be present in certain steels but was believed to be harmful. Careful research work, followed by many practical tests, has proved that copper is a valuable addition to many steels and cast irons.

This book is the third contributed by Battelle Memorial institute, Columbus, O., to the alloys of iron monographs series.

Coating Makes Paint Stick To Zinc and Cadmium

A new process has been developed by the American Chemical Paint Co., Ambler, Pa., for treating zinc base die castings and galvanized and cadmium plated surfaces, so that paint may be applied to these surfaces with the assurance that it will adhere. The rustproofing effect of zinc or cadmium plate is not impaired in the process, it is stated by the company.

For this purpose, a chemical known as Granodine No. 31 is furnished by the company. It is diluted with water, in a steel tank, and heated to a temperature of 160 to 170 degrees Fahr. Rinse tanks of wood or steel also are required for rinsing the coating.

The process consists in first removing any oil from the metals by degreasing, or by a mild alkaline cleaning which will not prove harmful to the zinc; the cleaned surfaces then are immersed in the heated chemical solution. The coating is completed in from 25 to 50 seconds, after which it is rinsed, first in cold water and then in hot water, to dry it. As soon as it is dry, the first coat of paint can be applied. Though the coating is insoluble and is said to be entirely resistant to rust, so that immediate application of paint is not necessary from a protection standpoint, it is desirable that the paint be applied immediately in order to prevent the accumulation of anything that would interfere with the proper application of the paint.

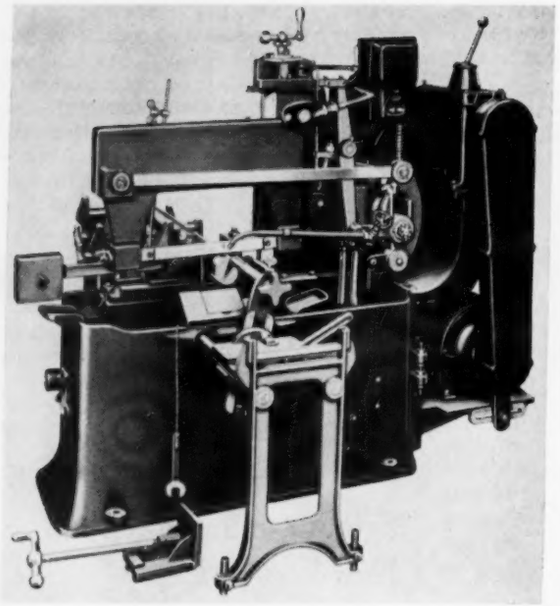
Not only does paint adhere tenaciously to the coating, says the company, but this coating is applied without harming the zinc. It is a mild treatment, in which none of the zinc is dissolved and replaced by other metals. The cost is approximately 20 cents per 100 square feet of surface coated.

Sulphur in Suspension in New Cutting Oil

A new cutting oil in which sulphur is held in stable suspension, rather than in solution or chemical combination, has been developed by the Thomas & Hochwalt Laboratories Inc., Dayton, O. The particles of sulphur in this oil are large enough to be seen with the eye. The base for this oil may be petroleum oil or other liquid vehicles. The new compound, known as Sulflo, is intended to stand up under low and high temperatures, the sulphur passing into the liquid state at 235 degrees Fahr. and taking up the burden of lubrication where the oil leaves off. Higher machining speeds and longer tool life are advantages claimed for the new product.

900 Barrels of Herring

PURSE SEINE FISHING BOAT ALL WELDED: Said to be the first all-welded steel boat of this type to be built in the Seattle district, this craft is owned by the Chatam Straits Fishing Co. and is in service at Crab bay, Alaska. It is 70 feet long, 19-foot beam and 9½-foot depth. Hold will accommodate 900 barrels of herring. Frames are of angle iron and welded on both sides all the way from the keel to the top. Deck and pilot houses also are all welded steel. Fuel tanks are located in a double bottom which is divided into seven independent units holding 7000 gallons of oil. Illustration is by courtesy of the Air Reduction Sales Co., New York



—Courtesy Armstrong-Blum Mfg. Co., Chicago

POWER hacksaw with automatic bar feed and four-speed transmission. Heavy tonnages of steel, carbon and alloy, are used both in such machines and in blades for power and hand hacksaws

LARGE USES OF STEEL IN SMALL WAYS

276th Article ◆ Hacksaws

FEW tools find such wide use in the metalworking industry as the hacksaw. Made of steel, hacksaws are employed in some manner wherever steel is fabricated, sometimes as one of the production operations and in other instances in connection with the preparation or repair of manufacturing equipment. Hacksaws are of either the hand or machine type, the latter being used for heavy sawing and for production work. Heavy-duty machines, similar to the type illustrated, are capable of sawing steel bars as large as 10 inches square.

The thousands of hacksaw blades manufactured annually offer a substantial market for alloy steel strip. Originally, blades were made from straight carbon steel, but this type has been superseded by the low tungsten and high-speed steels. Blades used with machines generally are made either completely of high-speed steel or a combination of this metal and a more elastic steel. To overcome breakage of the blade, which may occur because of the brittleness common to such hard material, one manufacturer offers a patented type that combines high-speed steel teeth with a tough alloy steel back.

In making this composite blade the teeth in the cutting edge are machine cut from a strip of high-speed steel which then is integrally welded by a special process to the back of a strip of chrome-vanadium steel. After being finished, the blade in appearance as well as in effect is one piece and has no tendency to shatter when in use.

Blades Vary in Size

For power machine work blades ordinarily are furnished in lengths of 12 to 24 inches, widths varying from 1 to 2 inches and weights from ¼ to slightly over 1 pound. The 14-inch blade is the most popular size. Different thicknesses are available for the various length and width dimensions, with 0.065 and 0.072-inch commonly used. Hand saws generally take blades 10 or 12 inches long and narrower in width and thickness than those employed on machines.

Sawing machines are made principally of cast iron, although certain parts, such as gears, shafting, etc., are rolled steel. The unit illustrated has a four-speed transmission and also is equipped with an automatic bar feed which provides a sequence of operations similar to that of an automatic screw machine. The automatic feature permits the machine to be set for cutting stock of a certain length and to continue to cut long bars into duplicate pieces without the attention of an operator.

This equipment is used for quantity production work, the automatic feed being easily disconnected when not required. In cutting small diameter bars or pipe, special nest clamps may be employed which enable the machine to saw a group of pieces simultaneously.

Safe Use of Belt Shippers Described in Pamphlet

Improper use of belt shippers, poles and perches for mechanical power transmission apparatus is a source of severe injury, according to the National Safety council, Chicago. The proper method of employing these devices is described in the council's recently revised Safe Practices Pamphlet No. 5, which also deals with belt shifters, clutches and remote control apparatus.

Belt shippers, the pamphlet states, are employed in the shipping of belts to and from pulleys on line or countershafts. It is much safer and better practice to have loose pulleys or idlers which make it unnecessary to ship and unship belts.

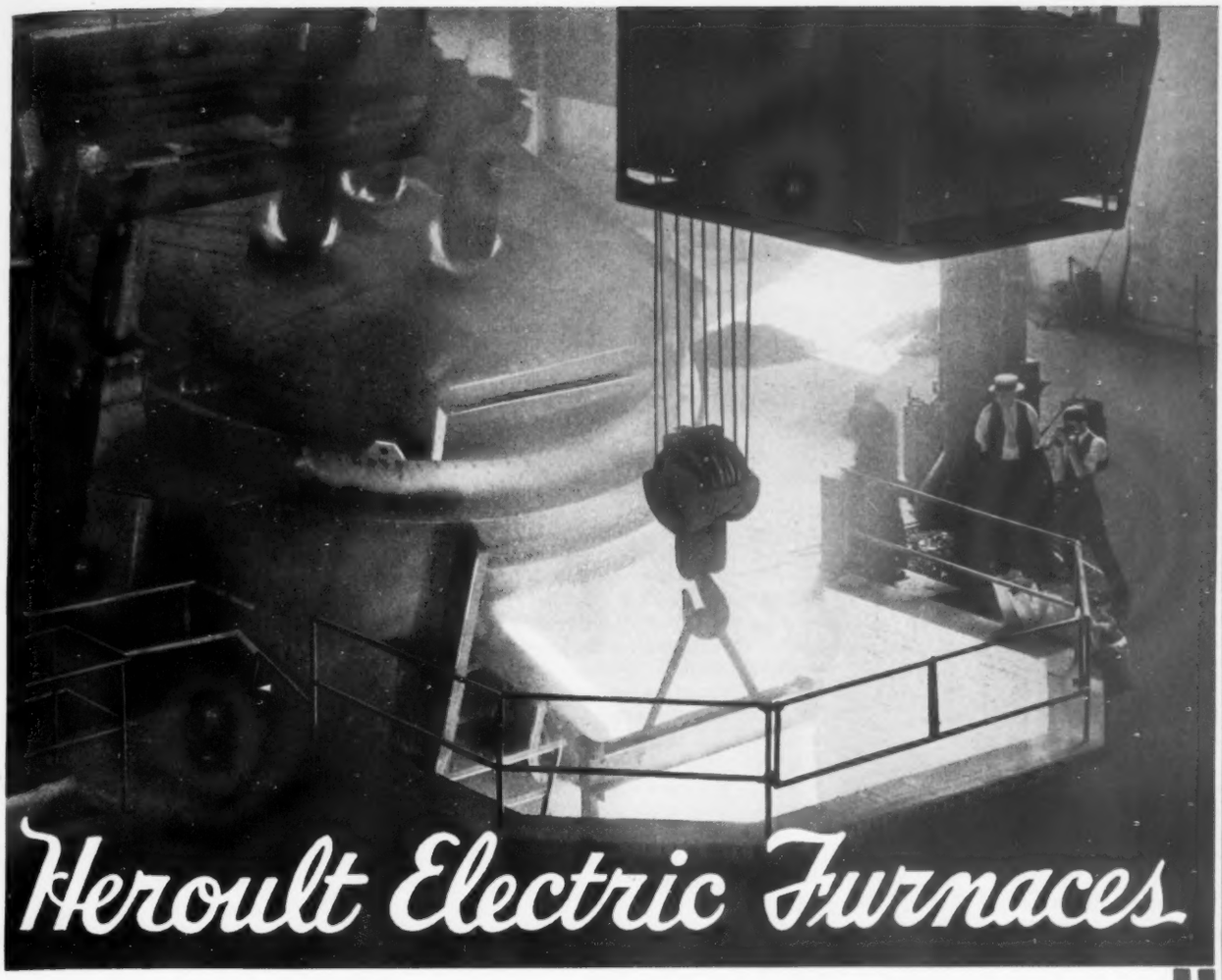
A belt should always be unshipped by throwing it off the driving and not off the driven pulley. When shipping a belt connecting a countershaft with a lineshaft the belt should first be put on the countershaft pulley and then thrown on the main line pulley.

Precautions with Ladders

If it is necessary for a workman to use a ladder while throwing a belt on a lineshaft pulley, another workman should be at the foot of the ladder to steady it, or the ladder should be equipped with safety hooks to prevent its swinging to one side. Such an operation should never be undertaken while the power is on. A third man at the controller can "inch" the shaft along until the belt has been put on.

When a ladder is used it should be placed on the side of the pulley opposite the belt. This position facilitates operation and reduces the danger of the workman becoming caught and drawn over the shaft. The use of a belt pole as a substitute for a mechanical shifter should be avoided.

Where loose pulleys or idlers are not practicable belt perches in the form of brackets, rollers or other devices should be used to keep the belts away from the shafts. A perch should be of sufficient width so that the belt will not tend to creep on the driving pulley. It also should be substantially made and so designed that the shipping of a belt to and from it can be done safely.

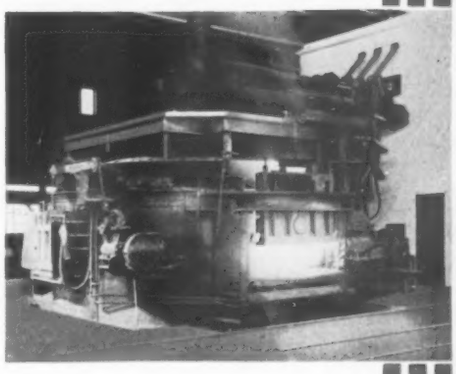


HALF TON to HUNDRED TON CAPACITIES

HEROULT ELECTRIC FURNACES are equipped with high-powered transformers and multiple voltage control to give maximum efficiency. Extra sturdy construction fits them for economical production of steels and other ferrous materials by either basic or acid process. Special refinements adapt them to the production of Stainless Irons and Stainless Steels.

Heroult furnaces are built for any capacity requirement, from 1/2 ton to 100 tons, and with open top, chute, machine or hand charging.

American Bridge Company can recommend and construct a Heroult furnace to meet your special needs.



Especially designed for Foundry Use . . . . .

Heroult Electric Furnaces are especially adapted to the production of high tensile strength Gray Iron,—*Gray Iron* of high fluidity, compressive strength, resiliency and fatigue resistance.

AMERICAN BRIDGE COMPANY

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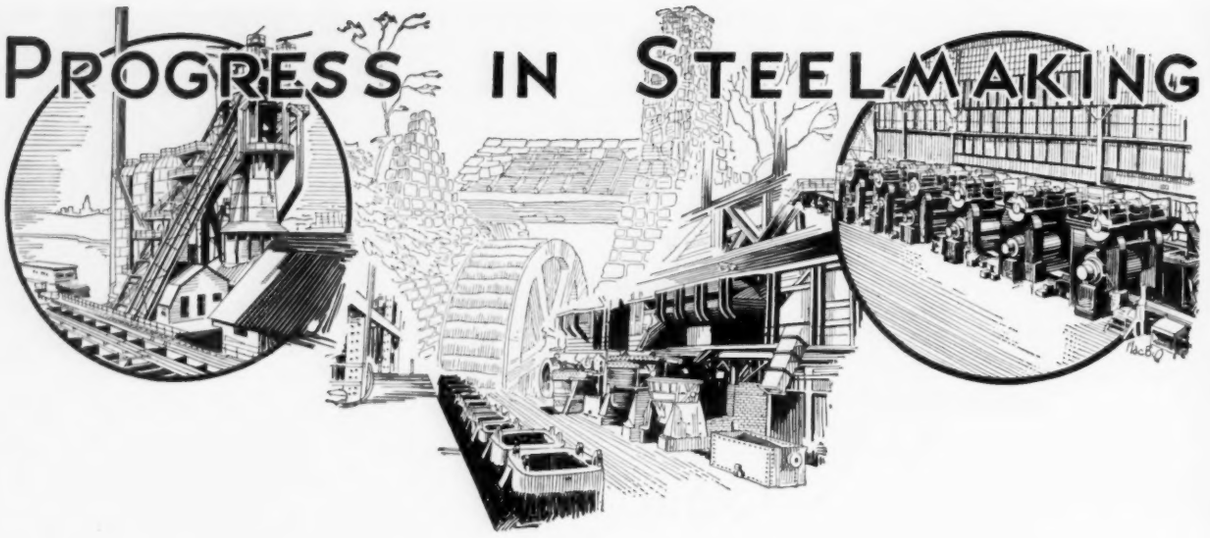
General Office: Frick Building, Pittsburgh, Pennsylvania

Contracting Offices: Baltimore, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Duluth, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City.

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

PROGRESS IN STEELMAKING



Affords Longer Service

Corrosion resistance of 4 to 6 per cent chromium steel tubing is about three times as great as that of plain carbon steel tubing. With 18 and 8 alloy steel the corrosion resistance is conservatively 50 times as great in oil refining as ordinary plain carbon tubing, provided it is operated under the same conditions.

• • •

Production Is Increased

Heating tin pots through the medium of immersion burners increased production at one plant 13 per cent and decreased the dross formation 75 per cent. The gas requirement amounted to 42 cubic feet per base box of tin plate coated and the variation in temperature 2½ degrees Fahr. Under former practice the temperature variation was 15 degrees.

• • •

How Hoop Stock Is Wiped

Wiping both the top and bottom surfaces of galvanized hoop stock 1¼ inches wide as it comes from the galvanizing kettle is accomplished at one plant in this country by the use of superheated steam. By this arrangement the excess zinc is returned to the pot in a clean state.

• • •

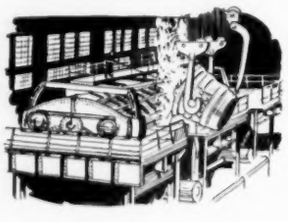
Tight Joint Is Assured

Many possibilities in the development of various classes of vacuum tubes and other devices wherein leading-in wires or conducting parts must pass through gas-tight insulating seals or themselves form part of a gas-tight chamber has been opened up by the development of a new metal-to glass seal which affords a tight and reliable joint between glass and a new alloy. The physical characteristic of the new alloy which makes possible this successful fusion with glass is its expansive curve, which coincides almost exactly with that of certain glasses. For this reason, no stresses are set up in either the glass or the alloy when cooling from the fusion temperature. The new material can be machined, forged, polished, drawn, stamped, soldered and welded with a facility equal to that with which these operations can be performed on a high grade nickel iron.

• • •

Reduces Radiation Loss

Total radiation and convection losses on a 600-ton hot metal mixer at a German steel plant amount to 2,182,400 B.t.u. per hour, which was sufficient to lower the temperature of the metal by 39 to 41 degrees Fahr. per hour, according to tests.



This radiation loss could be reduced 50 per cent by painting the exterior of the mixer with aluminum bronze which has a radiation factor of 2 as against 4 for oxidized steel.

• • •

Coating on Wire Varies

Tests made on many different makes of galvanized fencing and barbed wire show the coating to range from 0.25-ounce per square foot to about 0.6-ounce per square foot. These figures should be multiplied by two to afford proper comparison with the weight of coating on galvanized sheets which are recorded in total coating on both sides, according to an authority on galvanizing practice. The lighter the gage of wire, however, the less coating per unit of area. No means is known by which light gage wires will carry sufficient zinc out of the bath.

• • •

Bricks Are Self-Cleaning

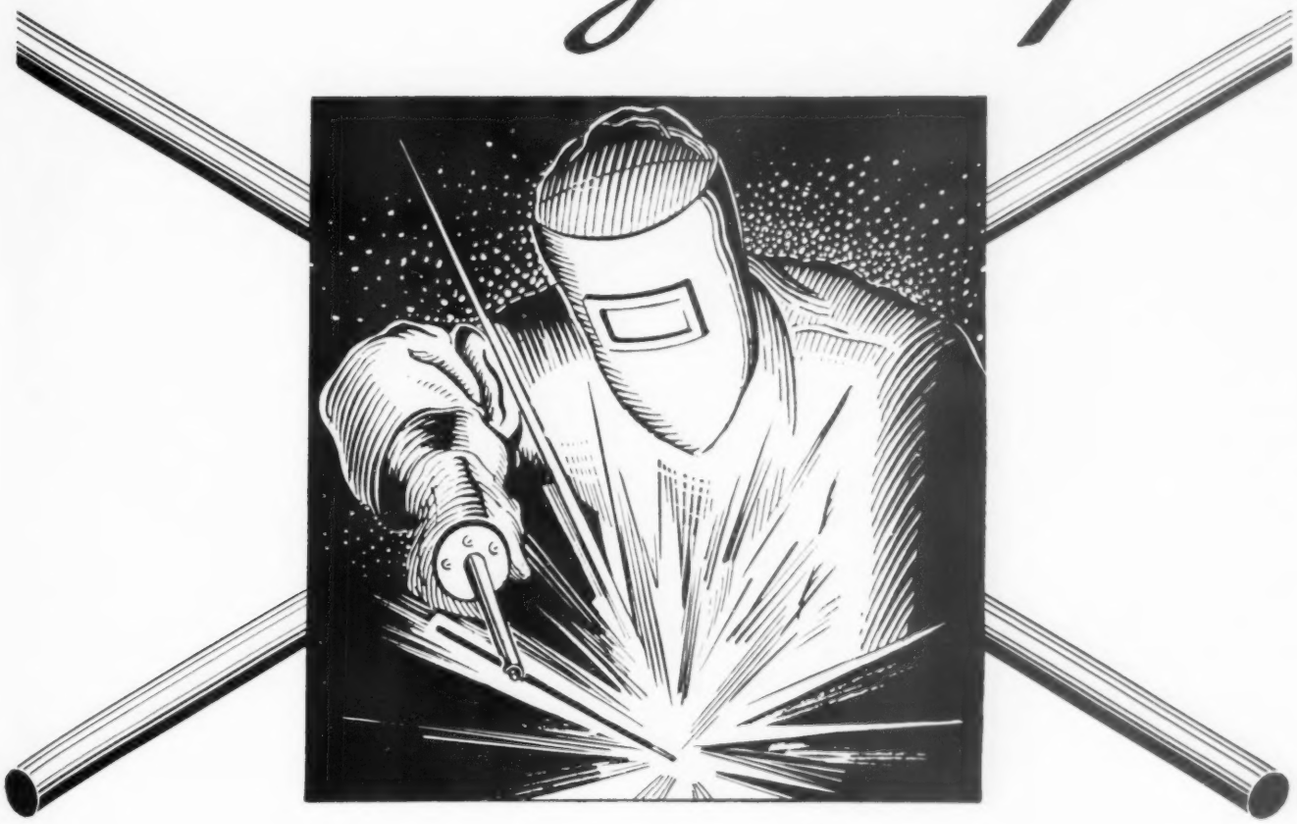
Checker brick with rounded surfaces have been placed on the market. The new shapes are self cleaning. High efficiency is claimed for these bricks because of the time the waste gases passing around them are in contact with the surfaces. Structural stability is secured by the symmetrical design of the bricks which is composed of perfect arches. Pockets and recesses are eliminated and the surfaces of the refractory shapes do not become insulated by accumulation of dust, slag, and other foreign materials. The brick are designed for use in open-hearth regenerators, soaking pits, heating furnaces and blast furnace stoves.

• • •

Rubber Absorbs the Shock

Flexible couplings consisting of a flange, a spider, a keeper and six rubber balls are now available for steel plant application. When the two halves are in place the balls occupy the pockets in the flange. As the torque to be transmitted varies, the lugs on the spider-half squeezes the balls correspondingly and these provide the resilience needed for shock absorption. The balls are under compression in either direction. In normal service the rubber balls last for many years. Removing the balls disconnects the load and permits running free for test purposes. The unit requires no lubrication.

No Mystery



IT'S THE CUSTOM-MADE STEEL THAT SPELLS THE DIFFERENCE!

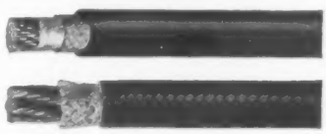
THERE are no mysterious secrets back of the quality of Roebling Welding Wire. This quality is due primarily to Roebling *Custom-Made* Steel.

This steel is specially made for welding purposes... from selected, pure melting stock... in small Roebling open-hearth furnaces that permit exceptionally close control of the melt.

Roebling *Custom-Made* Welding Steel costs more to produce than ordinary "tonnage" steel... and demands painstaking manufacturing methods. But it is bound to be absolutely uniform in quality and free of non-metallic impurities.

Let us send you data and samples of either electric or gas types.

ROEBLING WELDING CABLES: These cables are made in a complete line for arc welding purposes. Many leading welders consider them to be the finest welding cables on the market. Samples, data and prices gladly furnished.

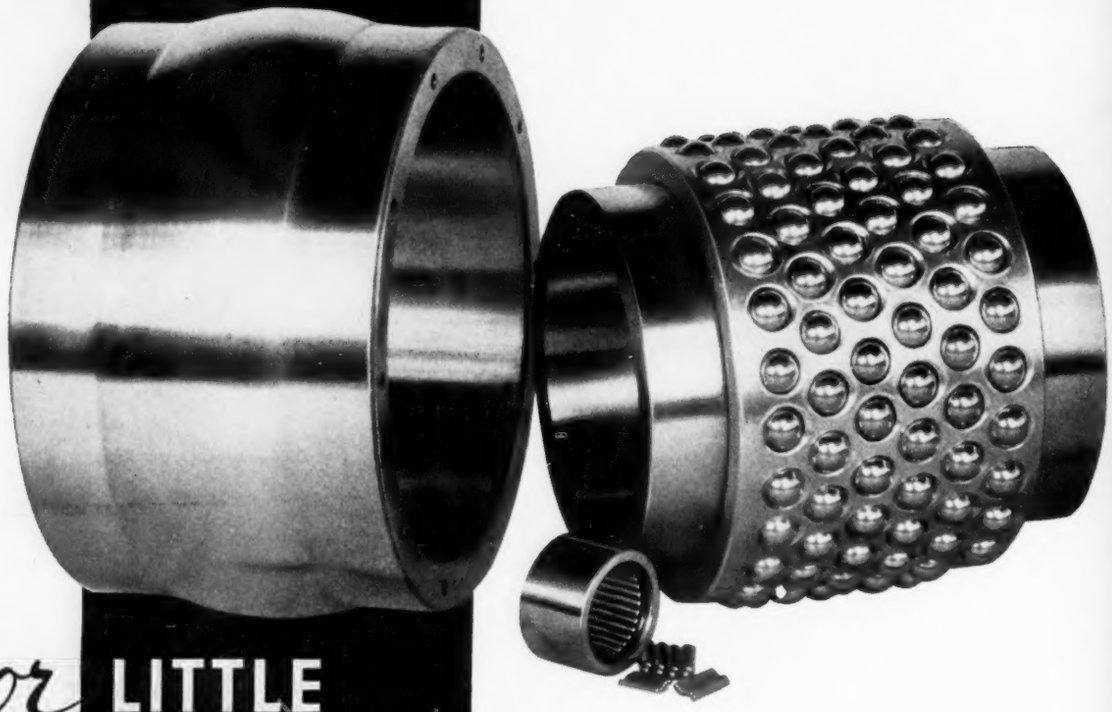


JOHN A. ROEBLING'S SONS CO.
Trenton, N.J. *Branches in principal cities.*

ROEBLING WELDING WIRE

Custom Made

For BIG ONES



or LITTLE ONES

ILLINOIS S·A·E·52100

simplifies manufacture and lengthens bearing life

S. A. E. 52100 is produced primarily for the exacting service demanded of bearing races, cones, and balls. Illinois Steel Company's careful control of electric furnace practice assures a very high degree of cleanliness and a uniform character from heat to heat.

The metallurgical cleanliness of Illinois' S. A. E. 52100 materially reduces the likelihood of costly rejections during heat treatment. Surface pitting or exfoliation during finishing and grinding operations is prevented. The steel will take a very high mirror finish. It also treats to a uniform and high degree of hardness, thus assuring longer bearing life.

For long and safe service from your bearings insist upon their manufacture from Illinois Steel Company's S. A. E. 52100.

Additional data on this or other alloy steels will be furnished upon request.

Illinois Steel Company

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ILLINOIS *alloy* STEEL

ALWAYS DEPENDABLE

A.S.M.E. Studies Engineering Materials and Performance

APPLICATION of new alloy steels to railway car equipment was one of the subjects discussed at the annual meeting of the American Society of Mechanical Engineers held in New York, Dec. 3-6. It was stated that of the many alloy steels now available, relatively few meet the requirements for this service.

In presenting a paper on this subject, A. F. Stuebing, railroad mechanical engineer, United States Steel Corp., New York, and E. S. Taylerson, manager research laboratory, and G. N. Schramm, corrosion research laboratory, American Sheet & Tin Plate Co., Pittsburgh, declared that the desired properties of steel for car equipment are increased strength, combined with high ductility, greater resistance to corrosion, a price which would not add greatly to the cost of the finished car, and adaptability in performing hot or cold without a like decrease in ductility.

This paper is presented in extensive form on page 28 of this issue of STEEL.

IN A symposium on the subject of materials, Dr. F. L. Everett, University of Michigan, Ann Arbor, Mich., presented a stress analysis of failures in machine parts. He asserted the type of loading and the distribution of stresses should receive special attention. Alternating stresses, in conjunction with insufficiently large fillets, keyways, shrink-fits or nonhomogenieties of material responsible for numerous important failures.

Dr. Everett analyzed a group of test case failures and made recommendations as to design. Insufficient fillets, he said, caused failures in separator teeth, motor car front axles and internal combustion engine valves and crankshafts. Abrupt changes of cross-section, where fillets could not be used, caused failures in crank-fit collars and in bolts and nuts. Undersized sections, he continued, caused failures in torsion springs, motor car main-leaf springs, connecting rods and crane hooks. Inadequacy of the stress analysis caused failures in heads of drums.

The fatigue of shafts with press-fitted members was discussed by R. E. Peterson and A. M. Wahl, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This problem, they declared, frequently arises in connection with rotating machinery, involving gears, wheels, couplings, rotors and so forth. Failures at the edge of fitted members are not uncommon in practice.

A survey of existing data was presented, after which was given a report of fatigue tests on the press-fit problem carried out at the Westinghouse research laboratories. A related photoelastic investigation and stress analysis also was reported; also practical expedients for increasing the strength of shafts with fitted members. Suggestions for future research were made.

Asserting that the term pitting, as used in his paper, meant a form of failure which occurs on gear teeth near the pitch circle, on rollers in antifriction bearings, and on other machined parts where cylindrical surfaces come in rolling contact, under heavy loads, Stewart Way, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., described an investigation into the manner in which pits develop, and with a view to finding what conditions must be filled to prevent their occurrence.

A testing machine was used in which steel rollers approximately 1.5 inches in diameter, rolling together and loaded, could be tested. More than 80 tests were made with rollers of different material, with different lubricants and with various rollers.

Pits were found to have a definite characteristic shape and orientation with respect to the direction of the rolling and to develop from minute cracks in the roller surfaces which appeared after approximately 500,000 revolutions.

Conclusions Are Listed

The principal findings were: (1) That a lubricant must be present if pitting is to take place; (2) that if the lubricant is of a viscosity above a certain critical value which depends on the load, pitting can be prevented; (3) that the nature of a surface finish on the rollers greatly influences the tendency to pit, pitting being prevented on the highly polished surface and accelerated on a rough-machined surface; (4) that nitrided rollers will not pit under surfaces that would result in severe pitting of quenched and tempered mild carbon steel rollers; and (5) that pits are smaller on harder surfaces, in general.

In the theoretical section of the paper the load-carrying capacity for the oil film between two rollers having a common peripheral velocity was calculated and it was shown that the crystal viscosity necessary to prevent pitting was far below that necessary to prevent metal-to-metal contact. The normal and tangential oil forces on the rollers after a metal-to-metal contact were also calculated and the tangential component was found to be small compared with the normal component.

Calculations showed that no tensile stress would exist at the surface where pitting cracks appear to start, due to contact pressure or oil forces. However, it was found that a small crack in the surface, if filled with oil, would tend to grow, provided it had a certain initial direction. Indications suggested that oil penetration of very small surface cracks with a certain initial direction is the reason for the growth of these cracks until a particle is separated from the main body of material, leaving a pit.

Studies Design of Covers

Strength in design of covers and flanges for vessel openings was discussed in a paper by T. McLean Jasper, H. Gregersen and A. M. Zoellner, A. O. Smith Corp., Milwaukee. Asserting that in the matter of hubbed flanges, considerable misapplication of theory has existed, the authors presented details on investigation designed to establish rational methods for the design of covers and flanges. A large number of rings and hubbed flanges were tested with regard to strength and the test results compared with theoretical calculations obtained from various formulas. The appropriate formulas to be used were given in forms convenient for engineering purposes.

Consideration was also given to questions of the effect of fillets at the junction of the flange and hub; of the bolt loads, with requirements for balance between the bolt sizes; of bolt material; and of the failure of the bolts under carelesss tightening.

Journal bearing design was covered in a paper presented at a session sponsored by the recently formed machine design division. This paper was in the form of a symposium on bearing practice and was presented by H. A. S. Howarth, vice president and general manager, Kingsbury Machine Works, Philadelphia. Considerable design and operating data had been furnished the author by makers of bearings for the trade and by manufacturers of machinery producing bearings for their own use; it therefore was possible to present an excellent cross section of the practices followed in bearing design for machinery of numerous types. No attempt was made by the author, however, to justify the practices outlined.

Effective use of tables and charts was made in correlating the data collected. One chart in particular covered the relation between pressure and velocity for various conditions of operation, and furnished a simple means for finding, besides this relation, the desirable oil viscosity.

journal radius, clearance ratio and minimum oil film thickness.

One point on which a wide divergence of opinion prevailed between manufacturers was in connection with bearing clearances. These clearances differed several thousandths of an inch even for relatively small diameter bearings for similar conditions.

In the matter of lubrication, the author pointed out that whatever system of oil classification is employed, it is essential that the oil be described as having a certain viscosity at a temperature close to that at which it will be used. In other words, a definite viscosity is the property which it is desired to attain at some definite operating temperature.

THE automotive industry leading in its acceptance, surface broaching as a major metal-cutting process has made considerable progress in other industries, according to Joseph Geshelin, engineering editor, *Automotive Industries*, Philadelphia. Surface broaching is claimed to be one of the most revolutionary developments in mass production in years. Mr. Geschelin outlined its general application, design of broaches and broaching machines with data on production covering broach speeds, tool life and output. In the automotive industry, surface broaching has replaced numerous long-accepted milling machine operations.

Calling attention to flexibility in design of surface broaching equipment, R. E. W. Harrison, chief, machinery and agricultural implement division, Department of Commerce, Washington, in making the annual progress report on machine shop practice, stated new broaching machines have provided maximum facilities for changing cutting tools rapidly with automatic chucking and unchucking the work. Where new surface broaching equipment has been applied, increased production with favorable influence on tool life has resulted, thereby materially reducing costs.

May Turn to Group Drive

Lightening of the metal-removal burden still prevails as essential with many production executives as enhancing the productivity of machine tools. As a result, the report stated, production engineers insist on forgings to much closer tolerances, sand-molded castings with a minimum of surplus metal, die castings and hot brass stampings, all with a view of reducing machining. There is an increased use of plastic compounds, notably in production of noiseless gearing. In many applications, plastic compounds can be molded and finished to size without, or with a minimum, of machining.

Controversy as to operating costs between individual motor and group drives continues. Mr. Harrison suggested the near future might bring an increased use of the group-drive. Unquestioned acceptance of the hydraulic principle for operating machine tool mechanisms is waning, the report holds, which will also have an influence on the type of drive which is adopted.

O. W. Boston and W. W. Gilbert, University of Michigan, Ann Arbor, Mich., reported on an investigation in which the three components of the metal cutting force are correlated with the relative cutting speed for a specific tool life and the cutting temperature as determined by the tool-work thermocouple method. The relation between the cutting forces and resulting temperatures developed is shown as the tool wears throughout its life when cutting a brittle and ductile steel under specific conditions of cut. The cutting temperature and the three components of the cutting force are shown as a function of cutting speed for each of the newly ground tool shapes in which such elements as nose radius, side-cutting angle, side-rake angle and back-rake angle are systematically varied.

Need of metal-cutting data easily usable by production executives was stressed in the report of the subcommittee by R. C. Deale, secretary. Four handbooks were suggested; (1) For general single-pointed paring tools as used for rough and finished machining on lathes and planers; (2) drilling, tapping, threading and reaming tools; (3) milling tools; and (4) miscellaneous tools, including those for gear-cutting thread milling, broaching and sawing. Much data required for the first handbook in such a series is available and is being compiled for early publication. This will include data on the following: Tool material, heat treatment, tool grinding, methods and equipment, effect of tool shape and chip proportions, effect of cutting speed on tool life, tool strength, including data for calculating allowable pressure, chip pressure, tangential and feeding pressure, horsepower data, chatter, ratio effect of unsupported length of work to the diameter, feed and other details.

Chip Formed by Depth of Cut

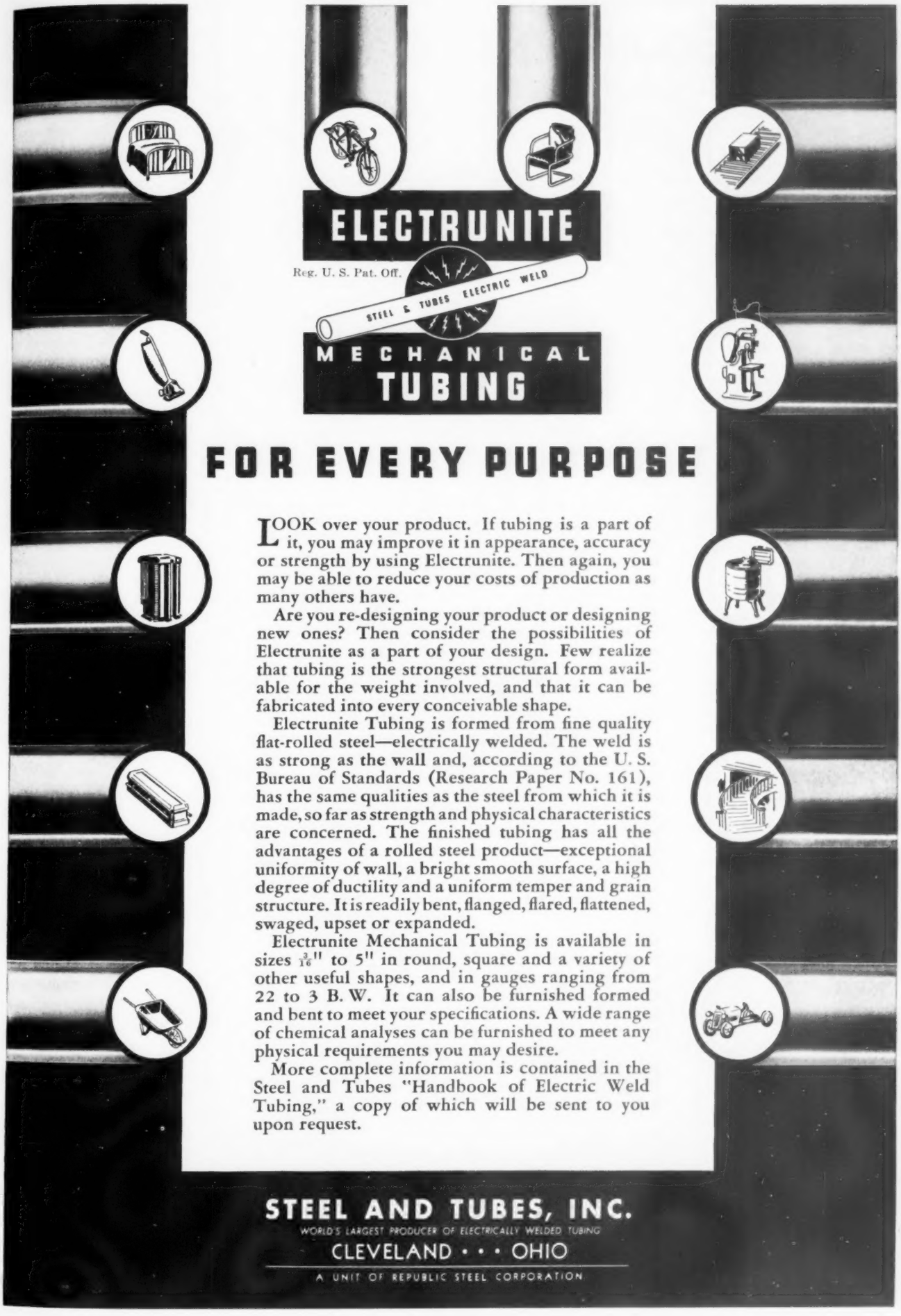
In metal removal, lateral flow characterizing the built-up edge, and causing its development, actually exists in all chip formation, according to investigation analysis by Hans Ernst, research engineer, Cincinnati Milling Machine Co., Cincinnati. This theory differs from the assumption of numerous investigators of the built-up edge, the wedge shaped portion of material which precedes the cutting edge of the working tool. This built-up edge has long been noted, but with a wide difference of opinion as to its formation and factors retarding or developing the edge, as actually existing in all chip formations.

Mr. Ernst contends the difference under various conditions of speed, depth, tool angle and material is one of degree rather than character. In any given case, existing chip formation, according to Mr. Ernst, is determined largely by the depth of the cut, the resistance to flow against the face of the cutting tool and the tensile strength of the material to be removed. Consistent reduction in size of the individual elements is found with decreasing the depth of cut, increasing rake angle, increasing tool sharpness, decreasing cutting speed and application of lubricant to the cutting tool face. Supplemented by photographs and photomicrographs of plastic flow, Mr. Ernst's investigations and resultant data comprise a

(*Please turn to Page* 56)

Bright Signs

SIGNS NOW MADE OF STAINLESS STEEL: New signs, made by the Stait Outdoor Sign Co., Philadelphia, now adorn the plant of the Bunting Glider Co., that city. The stainless steel first was treated over its entire surface with a chemical solution that made the surface sufficiently porous to hold the synthetic enamel paint but did not effect the surface in any way that could be discerned by the naked eye. That portion of the surface not to be painted then was "masked out," after which the lettering was sprayed with an air brush on the exposed metal.
Photo courtesy Hill-Chase & Co., Philadelphia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STEEL & TUBES ELECTRIC WELD
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TUBING
FOR EVERY PURPOSE
LOOK over your product. If tubing is a part of it, you may improve it in appearance, accuracy or strength by using Electrunite. Then again, you may be able to reduce your costs of production as many others have.
Are you re-designing your product or designing new ones? Then consider the possibilities of Electrunite as a part of your design. Few realize that tubing is the strongest structural form available for the weight involved, and that it can be fabricated into every conceivable shape.
Electrunite Tubing is formed from fine quality flat-rolled steel—electrically welded. The weld is as strong as the wall and, according to the U. S. Bureau of Standards (Research Paper No. 161), has the same qualities as the steel from which it is made, so far as strength and physical characteristics are concerned. The finished tubing has all the advantages of a rolled steel product—exceptional uniformity of wall, a bright smooth surface, a high degree of ductility and a uniform temper and grain structure. It is readily bent, flanged, flared, flattened, swaged, upset or expanded.
Electrunite Mechanical Tubing is available in sizes 3/16" to 5" in round, square and a variety of other useful shapes, and in gauges ranging from 22 to 3 B. W. It can also be furnished formed and bent to meet your specifications. A wide range of chemical analyses can be furnished to meet any physical requirements you may desire.
More complete information is contained in the Steel and Tubes "Handbook of Electric Weld Tubing," a copy of which will be sent to you upon request.
STEEL AND TUBES, INC.
WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING
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NEW EQUIPMENT

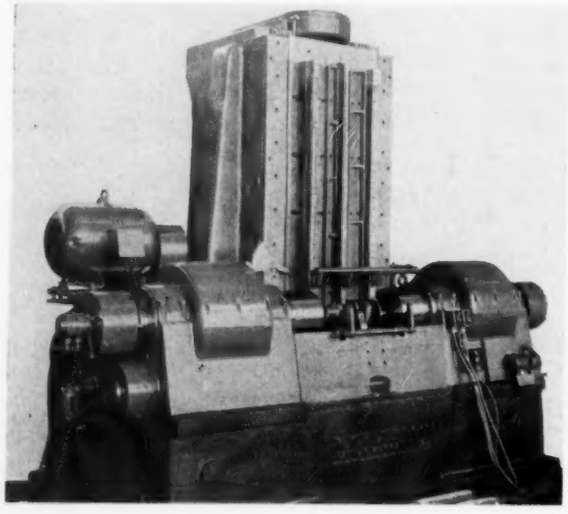
PRODUCTION FABRICATION
TREATMENT FINISHING

Broaching Lathe — Wickes Bros., Saginaw, Mich., recently developed a broaching lathe which is announced as a radically new development. On this lathe, shown herewith, the part being machined is revolved on its axis during the broaching operation. The unit is designed for rough and finish turning, filleting, facing and shouldering the external cylindrical surfaces of various machine parts.

Broaches are designed to provide free cutting at all times and to carry the chips away from the fillets and shoulders. One of the outstanding features of the broaching lathe is the high production obtainable and the long life of the broaches. Only a small amount of time is required for tool changes since the wear on the broaches is almost negligible. The broaches will produce from 50 to 100 times the number of pieces per grind that can be obtained with the best high speed tool bits, it is claimed.

The machine is equipped with hydraulic chucks and is semi-automatic in operation—that is to say, after the crankshaft has been secured in the hydraulic chucks, it is merely necessary for the operator to push the starter button whereupon the machine goes through the rough and finish broaching, operates automatic stop in the unloading position and automatically unloads the crankshaft out of the hydraulic chucks unto the loading fixture; the slide which carries the broaches then returns to the starting position and automatically stops in the position, ready for the next operation.

Feed to the broach slide is by means of a large diameter screw and an extremely heavy bronze nut adjustable for wear. The main drive is by means of a 20 horsepower motor with a 10 horsepower motor for the feed to the broach slide. A 2½ horsepower motor is used to drive the hydraulic pump for the hydraulic chucks and for the hydraulically-operated steady rest.



TURNING, filleting and facing of the three main bearings and pulley diameter adjacent to the front bearing are being accomplished on a cast alloy crankshaft in this Wickes broaching lathe. Broaches are arranged for both roughing and finishing

• • •

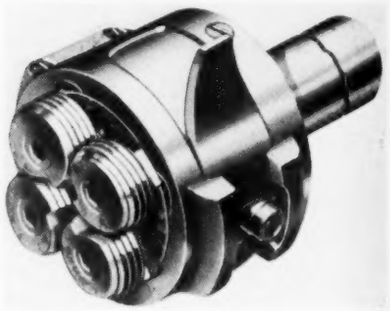
Boring Machine—Giern & Anholtt Tool Co. Inc., 1312 Mt. Elliott avenue, Detroit, recently brought out a new boring machine, shown above. The unit is built for the purpose of utilizing tungsten carbide as a boring medium. Both roughing and finishing operations can be carried on singly or simultaneously with this machine. Feed is hydraulic with all its characteristics including fast or jump feed, automatic return, etc. The fact that no gears are employed in the "Carbideborer" tends to prevent harmonic vibrations, the manufacturer claims. Stroke of this model is 18 inches. Feed varies from 0 to 315 inches per minute. Boring capacity ranges from ¾ to 2½ inches diameter. Because the machine operates vertically, chips are disposed of automatically.

Giern & Anholtt "Carbideborer" built for both roughing and finishing

The boring tool or bar fits in a No. 4 MT in the spindle nose and is guided through either one of two rotary bushings, depending on the depth of bore desired. One bushing is permanent on the adjustable arm while the other or front bushing is mounted either in fixture or the machine table. By thus guiding the tool through close fitting rotating bushings and insuring a vibrationless and fully supported travel throughout its full length, roughing becomes as practical as finishing, it is declared.

• • •

Self-Opening Die Heads—National Acme Co., 170 East One Hundred and Thirty-first street, Cleveland, is placing on the market a new line of self-opening die heads for Brown & Sharpe automatics, with either milled or ground thread circular chasers. These tools, shown herewith, are hardened and ground throughout and are of the pull-off type with safety release. The parts are entirely interchangeable and can readily be replaced in case of accident or breakage.



National Acme die heads have 0.056-inch minimum cutting capacity

Chasers are mounted externally to the head so that the cutting action does not take place inside of the die head proper. The chips are thrown outward and do not interfere with the free operation of the die head parts, and this also makes it possible to thread close up to a shoulder. Either straight or tapered threads in

a wide variety of thread forms can be successfully cut. This die head has been especially developed for use on Brown & Sharpe single spindle automatic screw machines.

When chasers are dull, removing one screw permits the operator to slip each block with its chaser, out of the head. A sharpened set can be slipped into place and operation resumed in a few seconds. Sharpening of chasers does not change the length of thread because the die chaser is always in the same relative plane until the entire circumference of the chaser has been ground away. Each chaser is essentially a circular forming tool and has a heavy body of metal back of the cutting edge which carries away the heat of cutting very effectively.

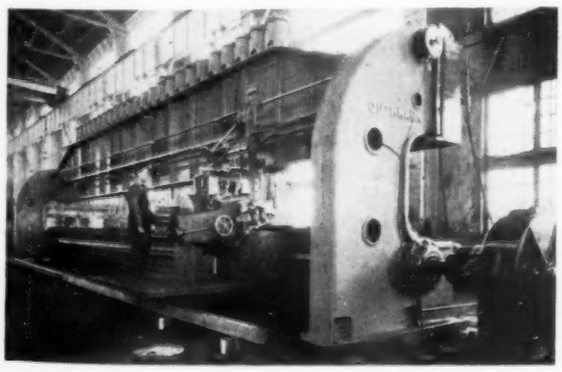
An added advantage is the fact that the chaser can be repeatedly ground until the entire periphery has been used up, which accounts for its long life and numerous grinds. It is a simple matter to change from right to left hand thread, using the same chaser by simply changing the chaser from a right to a left hand chaser block and grinding on the opposite face of the chaser.

♦ ♦ ♦

Heavy-Duty Plate Planer — Baldwin-Southwark Corp., Southwark division, Philadelphia, recently completed a plate planer, shown herewith, which will plane the edge of a plate 36 feet long by 4.7 inches thick and make an 18-inch scarf or slope on the edge of the plate. Cutting speed is variable from 15 to 45 feet per minute and cuts are made on both directions of travel of the tool holder.

Tool feed is from 1/128-inch to 1 inch per cut. Maximum vertical adjustment of the tool is 10½ inches and the maximum horizontal adjustment is 24 inches. The drive screw is 7 inches in diameter by 58 feet long, has a quintuple thread and runs in roller bearings. A 50 horsepower motor drives the machine, all controls being operated from the tool carriage on which the operator rides from end to end of the plate.

Pneumatically operated hold-downs grip and clamp the plate with a load of 120 tons. Pressure lubrication is used, many wearing surfaces being of hardened steel. Machine and operator are fully protected by safety devices. This plate planer is to be used in edge planing and scarfing of plates for some of the new vessels of the United States Navy.

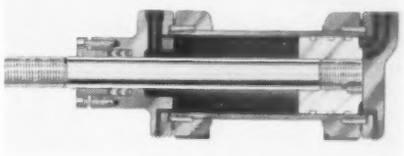


A STEEL plate 36 feet long and 4.7 inches thick can be handled by this Southwark heavy-duty plate planer which will make an 18-inch scarf or slope on the edge of the plate

♦ ♦ ♦

Hydraulic Cylinders — Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, is introducing a new line of double-acting cylinders for high-pressure hydraulic service. While only one type of mounting is illustrated, cylinders are available in numerous types and in a wide range of sizes, with practically any length of stroke required. The standard models are designed for working pressures up to 1500 pounds per square inch; in addition, special cylinders can be furnished for higher pressures.

A noteworthy feature of this designed cylinder is the fact that tie rods have been entirely eliminated, thus greatly enhancing the appearance of the product besides improving its ability to function satisfactorily in high pressure service without leakage. Another important feature claimed for this design is that



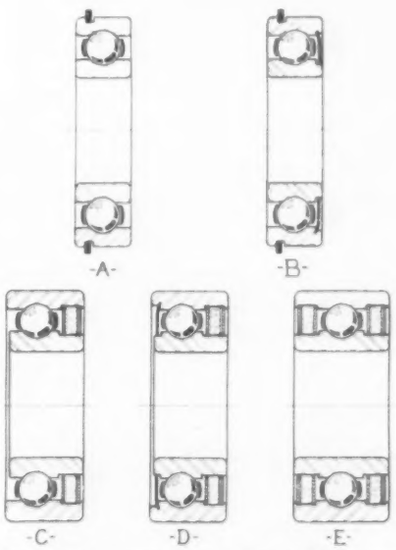
Sectional view of Hannifin double-acting hydraulic cylinder

cylinder caps can be removed without disturbing the mounting, thus facilitating replacement of gaskets and rendering the internal parts more readily accessible.

Air vent plugs are provided on each side of each cap so that when the cap is mounted with the inlet port at either side or the bottom there is always an air vent plug on the top or upper side. In addition to being furnished in a variety of types and sizes, these cylinders are also available either with a small diameter piston rod or with a 2 to 1 differential of the piston area; in the latter case the area of the piston on the piston rod side is substantially one-half of the large side. This is an important feature where it is necessary to provide reciprocating speed that is equal in both directions.

♦ ♦ ♦

Bearings—Norma-Hoffmann Bearings Corp., Stamford, Conn., reports an unusual interest in its more recent types of bearings which reduce the costs of machining and assembly. Among these is the "4000" series of ball bearings (*A*, in the accompanying illustration) the distinguishing feature of which is a snap ring of steel inserted in a groove in the periphery of the outer race, close to one face. This ring, protruding around the outer race, eliminates one shoulder from the housing—not only reducing cost of machining but also giving a more compact mounting.



Improved types of Norma-Hoffmann ball bearings used industrially

Closely related to this bearing is the "4000-P" series (*B*), differing from the "4000" series only by the addition of one side plate or shield, for the retention of grease. Both of these types are available in a range of metric sizes, in both light and medium series.

Three other types of precision bearings appealing to designers seeking lower production costs are: the "7000" series of felt-protected bearings (*C*) with a removable felt seal between metal plates; the "7000-P" series (*D*) with single felt seal and one side plate or shield, wholly enclosed for retention of lubricant; and the "77000"

series of sealed bearings (*E*) with two removable felt seals. These three latter types not only simplify machining and assembly, but also provide within themselves a capacity for grease ample for long periods of operation, according to the manufacturer.

♦ ♦ ♦

Gear Lapping Machine and Method—Hutto Engineering Co. Inc., 515 Lycaste avenue, Detroit, has developed a new method and machine for lapping gears. Making possible a new standard of precision, the innovation features a novel principle, that of angular inclination of lapping member with respect to that of the work piece gear in such a manner as to create a line of rolling contact between the lap and work piece at an angular position with respect to the position of the normal line of rolling contact on work piece tooth.

This new line of rolling contact normally intersects the conventional pitch line intermediate the extremi-

Hutto machine employed in new method of lapping gears

ties of the tooth face. Transference of the line of rolling contact causes a transference of the attendant sliding action in varying degrees of magnitude to all surfaces above as well as below the transferred line of rolling contact on the teeth of the gear, subjecting the normal or conventional pitch line (or normal line of rolling contact) on the teeth of the work piece gear to a sliding action.

In this manner, abrasive action is produced along the normal line of the gear tooth, by rotary motion only, without sacrificing full face width contact which is extremely beneficial in correcting bearing wobble, cross bearing, end bearing, etc. Two lapping members are employed at diametrically opposite sides of the work piece in combination with a supply of suitable abrading material.

Inasmuch as the axes of the lapping and work members lie in a common plane the "inclined axial engagement" of two or more geared members for gear lapping purposes is especially well suited to engagement of multiple lapping members with a multiple type of work piece gear, such as a cluster or herringbone gear and makes possible simultaneous lapping of two or more gear members on this type of gear.

The machine, shown herewith, is extremely simple to operate thus facilitating loading and unloading of the work piece gear as well as the lapping operation. Rotating speed and reciprocating stroke are variable so that the machine can be set for desired combinations of both to suit the particular gear to be lapped. This new "inclined axis" method and lapping equipment are adaptable to any type of cylindrical gear: spur, helical or internal.

♦ ♦ ♦

Wagon Drill—Worthington Pump & Machinery Corp., Harrison, N. J., recently developed a new wagon drill designed to speed up many classes of drilling that require a light weight mobile rig. The unit is adaptable for down-hole drilling, line drilling, hillside drilling, breast-hole drilling, side-hole drilling and snake-hole drilling; in fact its makers state that there is some part of any drilling work which the Rock Master can do more easily and more quickly than by using any other types of equipment.

The Rock Master, as the equipment is known, is furnished with a quick and effective hole-spotting device; can be supplied with feeds to accommodate a 3, 4 or a 6-foot maximum steel change and is recommended for holes up to 20-foot depth.

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Gondola and Flat Cars—Timken Roller Bearing Co., Canton, O., is calling attention to new gondola and flat cars using Timken-equipped inboard type trucks built by Standard Steel Car Corp., Canton Works, for Mesta Machine Co., Pittsburgh. Advantages of this inboard type truck for industrial and steel mill plant service are cited as follows: A considerable amount of weight is saved which reduces the cost of truck; outside journal boxes are eliminated which removes danger from striking obstructions along the track; axle and bearings are enclosed in solid housing, and bearings operate in oil bath; the inboard construction also provides stability and eliminates the derailment hazard. Accompanying illustration shows the new gondola car.

Gondola with Timken equipped inboard type trucks built by Standard Steel Car Corp., Canton Works, for Mesta Machine Co.

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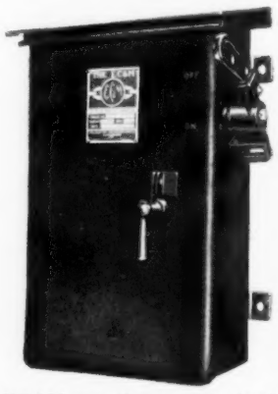
Safety Switches—Electric Controller & Mfg. Co., 2708 East Seventy-ninth street, Cleveland, is bringing out a new line of weather-proof, dust-tight type A safety switches in standard sizes from 30 amperes to 600 amperes capacity. These units, shown herewith, use the same switch mechanism that is furnished with the standard EC&M safety switch which is of type A construction and should not be confused with the type C safety switches of lighter construction.

These EC&M weather-proof or safety switches are equipped with fully interlocked door, making it impossible to operate the switch with the door open, or to open the door with the switch closed. They are enclosed in a 10-gage steel cabinet which has been rustproofed before the enamel is applied. A heavy sponge rubber gasket makes a tight seal between the door and cabinet. Outstanding features of these safety switches are compactness, narrow width, light weight, semi-floating, double break V-blades, and V-stationary contacts.



EC&M weather-proof, dust-tight safety switch

Cradle of rolled Monel Metal flat bars with loose riveted lower joints for uniform distribution of load are used for pickling cumbersome steel billets and blooms at a prominent seamless tube mill. The extended arms of the overhead steel truss rest on the edge of the pickling tank to keep the 25,000 lb. load of steel from damaging the tank bottom.

This Cradle's Load is No Child's Play!

25,000 *pounds of billets and blooms handled* SAFELY *in Monel Metal!*

PICTURE 12½ tons of cumbersome blooms and billets loaded on this Monel Metal cradle and eased gently into its pickling bath!

A load like that has to be distributed *evenly*. That's the reason for the loosely riveted lower joints. And it has to be carried *safely*. *That's the reason for Monel Metal.*

Monel Metal has the strength to carry the load... strength and to spare. And it has such tough indifference to the pickling bath that years of use won't eat it away to weaken or embrittle it.

Another important point is that there will be no dilution of the bath ...no excessive reaction between it and the Monel Metal.

The "bite" of the bath is all reserved for scale, dirt, and adhering material, which means better and quicker work; also few repairs and infrequent replacements for all kinds of pickling equipment. That goes for Monel Metal tie rods and nuts, tanks and linings, and pickling crates and baskets.

Good wood tanks last longer with MONEL METAL *Tie-Rods*

What's your pickling problem? Maybe we can help you lick it. Our engineers have picked up a lot of first hand, practical information that is on tap any time you want it. Write.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

Monel Metal

Monel Metal is a registered trademark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

A.S.M.E. Hears Data on Materials

(*Concluded from Page* 48)

new approach to the built-up edge problem.

THE Tschulenk forge-rolling process for production of large seamless steel tubes was described by Arthur J. Herschmann, New York representative, Vitkovice Steel Works, C. S. R., and Leopold Tschulenk, Czechoslovakia, in a joint paper before the iron and steel division. Seamless steel tubes and hollow steel vessels, 20 to 60 inches in diameter, are produced by this method in lengths up to 60 feet and of unusually high wall thickness down to approximately ⅝-inch. Tubes may be completed by this process, except in few special instances, from the original hollow steel block in a single pass without previous forging of the ingot and without machining after the pass. Manufacturing economies, design of the mill and its operation were described.

Discusses Mill Lubricants

Further improvement in design is needed for proper lubrication of reduction gears, pinion stands and other geared units in steel mill equipment, according to B. S. Burrell, Inland Steel Co., Chicago. Steel rolling mills are still being built for two types of lubricants, one for bearings and one for gears. Two lubricants in the same unit tend to cause contamination of one lubricant with another and Mr. Burrell described oil lubrication now being used on speed reduction sets and mill pinion stands, the same material on both teeth and bearings of strip mills, with good results. In each case filtering and circulation systems are employed. Cylinder stock oil is generally used, although first cost is larger. In the end, however, cost of this type of oil is lower. Where practical, installation of centralized lubrication systems is urged by Mr. Burrell, investments in this type of equipment having shown splendid results, both as to cost and efficiency. Close-fitting guards and shields to prevent accumulation of dust and dirt on gear sets and bearings on the older type of mill machinery are also favored as showing lower operating costs. Cleanliness and oil seals, where possible, also aid in older type mill operation.

Variation in products and equipment with variable climatic influence makes it impossible to lay down positive and fixed rules for steel mill lubrication in all plants, according to John F. Pelly, Bethlehem Steel Corp., Bethlehem, Pa. Taking one large complete mill unit, Mr. Pelly outlined lubrication requirements for practically the entire plant, from raw-material handling equipment to finishing mills, including coke ovens, blast furnace and open hearths. For one such plant, Mr. Pelly gave a tabulation of the oils and greases required, with broader applications for each lubricant, pointing out, however, that other steel plants would differ in a general way from the practice at the Bethlehem plant, due to difference in design, products, climatic factors and other details which call for individual practice, which is applicable to any specific mill.

Reviews Apprentice Training

The apprentice school in industrial education was discussed by John F. Smith, general superintendent, at General Electric Co., Erie, Pa., at a session devoted to apprentice training. For purposes of his remarks, Mr. Smith divided the apprentice training problem into three divisions: (1) Necessity; (2) aim; and (3) method. As to necessity, the speaker declared, there is now, in addition to a maintenance of supply of good machinists and toolmakers, the added important need for the development of men for supervision and service departments. Relative to the aim, he believed that training should be sufficiently high to give a good foundation for supervisors and minor executives, and as to method, that the plant school is best and that this school should be broader in scope than in the past and should be followed by an optional night school course for those who desire to fit themselves for the better positions in the factory.

Before giving these latter conclusions, however, Mr. Smith analyzed various considerations relative to the aim of apprenticeship training, declaring that it depends much on the individual management's decision regarding the necessity, and added that the method of training must in turn depend greatly on the aim of training.

Labor

(*Concluded from Page* 12)

dent's comments on labor clauses covered this point.

WEIRTON EMPLOYES ELECT

Last week at Weirton, W. Va., there was no contesting the vote of employes on their representation plan. A solid slate of Weirton employes was nominated on Dec. 10 to the exclusion of representatives from the Amalgamated Association of Iron, Steel and Tin Workers, an outside union. Although rules of the employe representation plan permit persons not employed by the company to be elected, the union failed to place a nominee.

More than 400 persons campaigned for the 98 nominations from which 49 representatives were selected at the election held Dec. 14. Of the 10,191 employes eligible to vote at Weirton Steel Co.'s three mills, 9245, or 90.7 per cent, cast ballots. Although interest ran high both on Dec. 10 and 14, there was no disorder.

William J. Long, president of the Weirton lodge of the Amalgamated, declared as early as Dec. 10 that his organization was not making a contest for offices in the election pending the outcome of the government's suit against the company now in federal court at Wilmington, Del., and, as STEEL reported Dec. 10, p. 17, which will be ruled upon around Feb. 1, 1935.

As an indication of the interest of employes in the election it was pointed out that only 5729 men, or 62 per cent, of the voters were on duty at the mills during the 24-hour period when the voting was conducted. Approximately 3500, or more than one-third of the total number of employes, were off duty, yet came into the mills and cast their ballots. The fact that more than 400 men actively campaigned for places on the nominating ballots was also cited as illustrative of employes' interest.

The Weirton election was carried on somewhat similar to a general political campaign. Many of the candidates distributed printed cards and other publicity material usually seen in election campaigns for public office. Polling booths were screened and no electioneering was permitted within 50 feet of the booths. An election board of five employes sat at each voting place to pass on eligibility and assist voters. Ballots were cast in sealed boxes.

LABOR FOR 5-POINT PROGRAM

American Federation of Labor last week announced a five-point legislative program it will push at the coming congress: 30-hour week; an industrial disputes act like the Wagner bill, outlawing company unions; reenactment of the recovery act; unemployment insurance and old age pensions; and complete restoration of federal employes salaries.

Trade Publications

PROTECTED METAL — American Brass Co., Waterbury, Conn., has published a bulletin on its copper-covered protected metal for a wide variety of applications.

DRAFT GAGES—Hays Corp., Michigan City, Ind., has issued bulletin No. 2018 describing its gages for indicating and controlling draft, pressure or flow of gas or air. Illustrations make clear its operation.

Steel Rate 33½; Strong Market Is Developing

Automotive Buying Expands—46,000 Tons of Rail and Accessories Placed —Raw Materials Active—$100,000,000 in New Steel Mill Equipment

A 3½-POINT rise to 33½ per cent in steelworks operations last week was accompanied by a substantial increase in consumption, especially by the automobile industry, heavier demand for pig iron and coke, and another sharp advance in scrap prices.

Iron and steel producers are keying production schedules not only to supply current requirements—which are at a higher level than at any time since June—but also in preparation for several months of continuing improvement, following the year-end holiday interruptions.

Specifications from automobile manufacturers last week were mainly responsible for lifting sheet mill production to an average of 42 per cent, some northern Ohio mills operating at 60 per cent. Motorcar output rose to 25,000, from 19,000 in the preceding week. Some of the new models feature all-steel "turret" tops, and molybdenum steel springs.

Reinforced with demand from agricultural implement manufacturers, whose production is at the highest point in three years, larger commitments by makers of household utilities, some gains in railroad purchases, and miscellaneous needs, iron and steel bookings this month are 50 per cent over the comparable period in November.

Santa Fe railroad has placed 25,883 tons of rails and 10,700 tons of track accessories; Northern Pacific 10,000 tons of rails; and the Bessemer & Lake Erie 100 seventy-ton hopper cars. Structural shape awards for the week—9408 tons—compared with 5551 tons in the preceding week, and are featured by 3000 tons for the first large commercial structure to be built in the New York metropolitan area in several months.

Demand for Raw Materials Is Heavier; Steel Mill Equipment To Be Expanded

A strong undertone continues in the scrap market, with STEEL's composite up 21 cents to $11.12, highest since the second week in May. Dealers and exporters are bidding against consumers in some districts. It is reported Japan has purchased nine vessels on the Pacific coast for scrap.

Three more blast furnaces have been lighted, one at Toledo, O., Lorain, O., and Youngstown. A lake furnace interest booked 15,000 tons of pig iron, one-third for shipment this month. Consumption of foreign iron along the Atlantic seaboard has left only one merchant stack in operation there.

A new wave of rolling mill equipment buying is expected shortly. National Steel Corp. within six months is to spend $12,000,000 for new sheet and strip mills at its Great Lakes Steel (Detroit) division, while Ford has appropriated $7,500,000 additional for expansion at its River Rouge plant. Carnegie Steel Co. is expected to inquire soon for two plate mills for its Homestead, Pa., works, and has plans for new hot-strip and rail mills at its Edgar Thomson works. Bethlehem Steel Corp. contemplates a hot-strip mill for its Lackawanna (Buffalo) plant.

Steel mill equipment programs under way or contemplated aggregate $100,000,000. This total includes $40,000,000 for the United States Steel Corp. In addition, Standard Oil Co. of New Jersey will spend $60,000,000 to $70,000,000 for modernization in 1936.

Steelworks Operations Increased in Six Districts; British Production Steady

In prices, drawing extras of $5 a ton on certain automobile parts using cold-finished steel sheets have been eliminated. Stock tin plate, as a separate classification, has been definitely abolished.

Steelworks operations last week advanced 11 points to 59 per cent at Cleveland; 5 to 32½, Birmingham; 1 to 24, Pittsburgh; 1½ to 35½, Chicago; 4 to 39, Youngstown; 11 to 59, Detroit. They were unchanged at 70, Wheeling; 24, Buffalo; 47, New England, and down ½-point to 19½, eastern Pennsylvania.

British iron and steel works are well booked for early next year, though at present the markets are seasonally quieter, STEEL's London correspondent cables. Production of ingots and castings in Great Britain in November totaled 776,000 tons, the daily average being 2 per cent below October. November pig iron output was 527,100 tons, the daily rate being less than 1 per cent under October.

STEEL's iron and steel price composite is up 9 cents to $32.44, on advances in scrap. The finished steel index remains $54.

COMPOSITE MARKET AVERAGES

	Dec. 15	Dec. 8	One Month Ago Nov., 1934	Three Months Ago Sept., 1934	One Year Ago Dec., 1933	Five Years Ago Dec., 1929
Iron and Steel Composite	$32.44	$32.35	$32.15	$32.15	$31.01	$35.43
Finished Steel Composite	54.00	54.00	54.00	54.00	51.10	56.33
Steelworks Scrap Composite	11.12	10.91	9.82	9.45	10.12	13.73

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip and cast iron pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Dec. 15, 1934	Nov. 1934	Sept. 1934	Dec. 1933
Finished Material				
Steel bars, Pittsburgh	1.80	1.80	1.80	1.75
Steel bars, Chicago	1.85	1.85	1.85	1.80
Steel bars, Philadelphia	2.09	2.09	2.09	2.04
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.60
Shapes, Pitsburgh	1.80	1.80	1.80	1.70
Shapes, Philadelphia	2.00½	2.00½	2.00½	1.90½
Shapes, Chicago	1.85	1.85	1.85	1.75
Tank plates, Pittsburgh	1.80	1.80	1.80	1.70
Tank plates, Philadelphia	1.98½	1.98½	1.98½	1.88½
Tank plates, Chicago	1.85	1.85	1.85	1.75
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.75
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.25
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	2.85
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.85
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.55	2.35
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	2.95
Plain wire, Pittsburgh	2.30	2.30	2.30	2.20
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.60	2.60	2.60	2.35
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$28.00	28.00	28.00	26.00
Sheet bars, open-hearth, Pitts.	28.00	28.00	28.00	26.00
Billets, open-hearth, Pittsburgh	27.00	27.00	27.00	26.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00

	Dec. 15, 1934	Nov. 1934	Sept. 1934	Dec. 1933
Pig Iron				
Bessemer, del. Pittsburgh	19.76	19.76	19.76	19.26
Basic, Valley	18.00	18.00	18.00	17.00
Basic, eastern, del. eastern Pa.	19.76	19.76	19.76	18.76
No. 2 foundry, del. Pittsburgh	19.26	19.26	19.26	18.76
No. 2 foundry, Chicago	18.50	18.50	18.50	17.50
Southern No. 2, Birmingham	14.50	14.50	14.50	13.50
No. 2X eastern, del. Philadelphia	20.63	20.63	20.63	19.63
Malleable, Valley	18.50	18.50	18.50	17.50
Malleable, Chicago	18.50	18.50	18.50	17.50
Lake Superior charcoal, del. Chi.	24.04	24.04	24.04	23.54
Gray forge, del. Pittsburgh	18.63	18.63	18.88	18.38
Ferromanganese, del. Pittsburgh	89.79	89.79	89.79	87.24
Scrap				
Heavy melting steel, Pittsburgh	$13.25	11.15	10.75	12.20
Heavy melt. steel, No. 2, east. Pa.	9.50	8.35	8.00	8.25
Heavy melting steel, Chicago	10.50	9.10	8.65	9.00
Rails for rolling, Chicago	11.75	10.35	10.05	10.35
Railroad steel specialties, Chicago	11.75	10.05	9.80	10.50
Coke				
Connellsville, furnace, ovens	3.60	3.60	3.60	3.75
Connellsville foundry, ovens	4.60	4.60	4.60	4.25
Chicago, by-product foundry, del.	9.25	9.25	9.25	9.25

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.85c
Gary, base	1.95c
Chicago, del.	1.98c
New York, del.	2.18c
Philadelphia, del.	2.14c
Birmingham, base	2.00c
St. Louis, del.	2.17c
F.o.b. cars, dock, Pacific ports	2.40c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.40c
Gary, base	2.50c
Chicago, del.	2.53c
Detroit, del.	2.60c
New York, del.	2.73c
Philadelphia, del.	2.69c
Birmingham, base	2.55c
St. Louis, del.	2.72c
F.o.b. cars, dock, Pacific ports	3.05c

GALVANIZED No. 24

Pittsburgh, base	3.10c
Gary, base	3.20c
Chicago, del.	3.23c
Philadelphia, del.	3.39c
New York, del.	3.43c
Birmingham, base	3.25c
St. Louis, del.	3.42c
San Francisco, f.o.b. cars, dock	3.70c

TIN MILL BLACK No. 28

Pittsburgh, base	2.75c
Gary, base	2.85c
St. Louis, del.	3.07c

COLD ROLLED No. 10

Pittsburgh, base	2.50c
Gary, base	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.79c
New York, del.	2.83c
F.o.b. cars, dock, Pacific ports	3.10c

COLD ROLLED No. 20

Pittsburgh, base	2.95c
Gary, base	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.24c
New York, del.	3.28c

ENAMELING SHEETS

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher.

Tin plate, coke base contract	$5.25
Do., stock	$4.90
Long ternes, No. 24 unassorted	3.40c

Corrosion and Heat Resistant Alloys

Pittsburgh, base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold strip	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh, base	1.80c
New York, del.	2.08c
Philadelphia, del.	1.98½c
Boston, del.	2.20c
Buffalo, del.	2.03½c
Chicago or Gary base	1.85c
Cleveland, del.	1.98½c
Birmingham, base	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific Coast, f.o.b. cars, dock	2.35c
St. Louis, del.	2.07c

Structural Shapes

Pittsburgh, base	1.80c
Philadelphia, del.	2.00½c
New York, del	2.05¼c
Boston, del.	2.18½c
Bethlehem, base	1.90c
Chicago, base	1.85c
Cleveland, del.	1.98½c
Buffalo, base	1.90c
Gulf ports	2.20c
Birmingham, base	1.95c
Pacific Coast, f.o.b. cars, dock	2.35c

Bars

SOFT STEEL

Pittsburgh, base	1.80c
Chicago or Gary	1.85c
Duluth, base	1.95c
Birmingham, base	1.95c
Cleveland, base	1.85c
Buffalo	1.90c
Detroit, del.	1.95c
Pacific Coast ports cars, dock, c.i.f.	2.35c
Philadelphia, del.	2.09c
Boston, del.	2.20c
New York, del.	2.13c
Pitts., forg. qual.	1.95c-2.05c

RAIL STEEL
To Manufacturing Trade

Pittsburgh, base	1.70c
Chicago or Gary, base	1.75c
Moline, Ill., base	1.75c
Cleveland, base	1.75c
Buffalo, base	1.80c

IRON

Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia, base	1.89c
Pittsburgh, refined	2.75c-7.50c

REINFORCING

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.34c

Rail Steel

Straight lengths quoted by distributors

Pittsburgh, base	1.90c
Chicago, Buffalo, Cleveland, Birm., Young	1.95c
Gulf ports	2.30c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pitts.-Cleve. 100 lb. keg

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
Do., 16 gage and finer	5.10c

(Per pound)

Polished staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting □ □

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot) □

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.45c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50
4600 0.20 to 0.30 Mo. 125-1.75 Ni. 1.05
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon Van. 0.95
9250.....Carbon base plus extras

Piling □ □

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops □

Hot strip to 23⅞-in.

Pittsburgh	1.85c
Chicago, base	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Phila., delivered	2.14c
New York, del.	2.18c

Cooperage hoop,

Pittsburgh	1.95c
Chicago	2.05c

Cold-rolled strip,

Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material □

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
24-45 lbs.	$27.00
50-60 lbs.	$24.00
70-75 lbs.	$18.00
80-85 lbs.	$25.00
100 lbs.	$26.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll. qual.	$34.00
Angle bars, mills	2.55c
Spikes, R. R. base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs. up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70-10-10 off
Rolled thread, ½ x 6 and smaller	70-10-10 off

MACHINE BOLTS

All sizes, cut thread lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts,	70-10-10 off
Tire bolts	60-10 off
Stove bolts, 75 off in pkgs.; 83 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch	
Rolled thread machine bolts, ½ x 6 and smaller	70-10-10 off
Step bolts	70-10 off
Elevator bolts	70-10 off

NUTS

S.A.E. semifinished hex.; ½ to ⅞-inch	70-10-10 off
Do., ½ to 1-inch	70-10-10 off
Do., over 1-inch	70-10-10 off

HEXAGON CAP SCREWS

Milled	85 off
Upset, 1-in., smaller	85 off

SQUARE HEAD SET SCREWS

*Upset, 1-in, small	70-10 off
*Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila.	6.00 off

Cut Nails □ □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

In.	Blk.	Gal.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

LAP WELD

Steel

2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½

Iron

2	37	22½
2¼—3½	38	25
4—8	40	28½

LINE PIPE

Steel

⅛, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½-inch, black and galv. take 4 pts. over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$38.00-39.00
4-in., Birmingham	41.00-42.00
4-in., Chicago	49.00-50.00
6 to 24-in., Chicago	46.00-47.00
6-in. & over, east fdy.	42.00
Do., 4-in.	45.00

Class A pipe $2 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel □

BILLETS AND BLOOMS

4 x4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$27.00
Philadelphia	32.30
Duluth	31.00
Forging, Pitts., Chi. and Buffalo	32.00
Forging, Duluth	36.00

SHEET BARS

Pitts., Cleve., Young., Chi., Buff., Canton, O., and Sparrows Point, Md.	28.00

SLABS

Pitts., Cleve., Young.	27.00

WIRE RODS

Pitts., Cleveland	38.00
Chicago	39.00
Worcester, Mass.	40.00

SKELP

Pitts., Chicago	1.70c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville, fur.	$3.60- 3.85
Connellsville, fdry.	4.60
Connell. prem. fdry.	5.10
New River fdry.	6.00
Wise county fdry.	4.45- 5.25
Wise county fur.	4.00- 4.50

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi., ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	11.00
St. Louis, del.	9.25
Birmingham, ovens	6.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.50
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots	Spot
Pure benzol	19.00c
90 per cent benzol	19.00c
Toluol	30.00c
Solvent naphtha	26.00c
Commercial xylol	26.00c

Per lb. f.o.b. New York

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

†Naphthalene flakes and balls, in bbl.	5.50c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25; 50-cent differentials apply to any grade below 1.75. Gross tons.

BASING POINTS:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Birmingham, Ala., southern del.	14.50	.....	13.50	19.00
Buffalo	18.50	19.00	17.50	19.50
Chicago	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Duluth	19.00	19.00	.....	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Everett, Mass.	19.50	20.00	19.00	20.50
Granite City, Ill.	18.50	18.50	18.00	.....
Hamilton, O.	18.50	18.50	18.00	19.00
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Sparrows Point, Md.	19.50	.....	19.00	.....
Swedeland, Pa.	19.50	20.00	19.00	20.50
Toledo, O.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
DELIVERED FROM BASING POINTS:				
Akron, O., from Cleveland	19.76	19.76	19.26	20.26
Baltimore from Birmingham	20.02	.....	19.90	.....
Boston from Birmingham	19.62	.....	19.50	.....
Boston from Everett, Mass.	20.00	20.50	19.50	21.00
Boston from Buffalo	20.00	20.50	19.50	21.00
Brooklyn, N. Y., from Bethlehem	21.77	22.27	.....	.....
Brooklyn, N. Y., from Bmghm.	21.39	.....	.....	.....
Canton, O., from Cleveland	19.76	19.76	19.26	20.26
Chicago from Birmingham	†18.72	.....	18.60	.....
Cincinnati from Hamilton, O.	19.51	19.51	19.01	.....
Cincinnati from Birmingham	19.13	.....	19.01	.....
Cleveland from Birmingham	18.62	.....	18.50	.....
Indianapolis from Hamilton, O.	20.77	20.77	20.27	21.27
Mansfield, O., from Toledo, O.	20.26	20.26	19.76	20.76
Milwaukee from Chicago	19.50	19.50	19.00	20.00
Muskegon, Mich., from Chicago, Toledo or Detroit	21.40	21.40	20.90	21.90
Newark, N. J., from Birmingham	20.51	.....	.....	.....
Newark, N. J., from Bethlehem	20.89	21.39	.....	.....
Philadelphia from Birmingham	19.88	.....	19.76	.....
Philadelphia from Swedeland, Pa.	20.26	20.76	19.76	.....
Pittsburgh district from Neville Island	(Neville Island base, plus 63c, 76c and $1.13 switching chgs.)			
Saginaw, Mich., from Detroit	20.60	20.60	20.10	21.10
St. Louis from Granite City, Ill.	19.00	19.00	18.50	.....
St. Louis from Birmingham	18.62	.....	18.50	.....
St. Paul from Duluth	20.94	20.94	.....	21.44

†Over 0.70 phos.

LOW PHOS.

Basing Points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.50. Basing Point: †Johnson City, Tenn.—$23.50 †Off grade material is $19.50

Philadelphia, standard and copper bearing 24.63

GRAY FORGE		CHARCOAL	
Valley furnace	18.00	Lake Superior fur.	21.00
Pitts. dist. fur.	18.00	Do., del. Chicago	24.04

SILVERY†

Jackson County, O., base; 6%—$22.75; 7—$23.75; 8—$24.75; 9—$25.70; 10—$26.75; 11—$27.75. Buffalo base prices $1.25 higher.

BESSEMER FERROSILICON†

Jackson County, O., base; 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Iron Ore

LAKE SUPERIOR ORE

Gross ton, 51½% Lower Lake Ports

Old range besemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$17.75-18.25
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00

Manganese Ore

(Nominal)

Prices, not including duty, cents per unit cargo lots.

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories

Per 1000 f.o.b. Works

FIRE CLAY BRICK

First Quality

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	45.00

Second Quality

Pa., Ill., Ky., Md., Mo., Ga., Ala.	40.00

Ohio

First quality	$40.00
Intermediary	36.00
Second quality	25.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

MAGNESITE

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	40.00
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash.	22.00

BASIC BRICK

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemically bonded magnesite	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$19.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$15.50-16.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsburgh	89.79
Spiegeleisen, 19-20% dom. fur. spot†	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00

Spot, $5 a ton higher.

Silicomang., 2½ carb.	90.00
2% carbon, 95.00; 1%,	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17.-19% Rockdale, Tenn., basis, 18%, $2 unitage	42.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	55.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.50
Copper, hot rolled	16.00
Lead, cut, to jobbers	7.50
Zinc, 100-lb. base	9.50
Tubes and Pipes	
High yellow brass	17.00
Seamless copper	17.25
Rods	
High yellow brass	13.00
Copper, hot rolled	13.25
Anodes	
Copper, untrimmed	13.75
Wire	
Yellow brass (high)	15.00

Old Metals

Dcal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	4.12½-4.37½
Chicago	4.25- 4.50
Cleveland	4.75- 5.00
St. Louis	4.25- 4.50
Heavy Copper and Wire	
New York	5.50- 5.75
Chicago, No. 1	5.50- 5.75
Cleveland	5.00- 5.50
St. Louis	5.00- 5.25
Composition Brass Borings	
New York	3.75- 4.00
Light Copper	
New York	4.37½-4.62½
*Chicago	4.25- 4.75
Cleveland	4.25- 4.75
St. Louis	4.25- 4.50
Light Brass	
Chicago	2.12½-2.37½
Cleveland	2.25- 2.50
Lead	
New York	2.65- 2.75
Cleveland	2.50- 2.75
*Chicago	2.50- 2.75
St. Louis	2.65- 2.75
Zinc	
New York	1.75- 2.00
Cleveland	1.75- 2.00
St. Louis	2.40- 2.50
Aluminum	
Borings, Cleveland	6.50- 7.00
Mixed, cast, Cleve.	11.25-11.75
Mixed, cast, St. L.	11.50-12.00
Clips, soft, Cleve.	12.75-13.25

Secondary Metals

Brass ingot, 85-5-5-5	8.25
Stand, No. 12 Alum.	15.00

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL □

Birmingham	8.00- 8.50
Boston, dock, expt	8.00- 8.25
Boston, domestic	6.50- 6.75
Buffalo, No. 1	9.75-10.25
Buffalo, No. 2	8.75- 9.25
Chicago, No. 1	10.25-10.75
Cleveland, No. 1	10.00-10.50
Cleveland, No. 2	9.50-10.00
Detroit, No. 1	9.00- 9.50
Detroit, No. 2	8.00- 8.50
Eastern Pa.	11.00
Eastern Pa., No. 2	9.50
Federal, Ill.	7.50- 8.00
Granite City, R. R.	8.50- 9.00
Granite City, No. 2	6.50- 7.00
N. Y., deal. No. 2	7.00
N. Y., deal. R. R.	8.50
Pittsburgh, No. 1	13.00-13.50
St. Louis	7.50- 8.00
Valleys, No. 1	12.50-13.00

COMPRESSED SHEETS □

Buffalo, dealers	8.75- 9.25
Chicago, factory	8.75- 9.25
Cleveland	10.00-10.50
Detroit	9.25- 9.75
E. Pa., new mat.	9.50-10.00
Pittsburgh	13.00-13.50
St. Louis	5.50- 6.00
Valleys	12.00-12.50

BUNDLED SHEETS □ □

Buffalo	6.50- 7.00
Cincinnati, del.	6.50- 7.00
Cleveland	7.50- 8.00
Pittsburgh	11.50-12.00
St. Louis	4.50- 5.00

SHEET CLIPPINGS, LOOSE □

Chicago	5.50- 6.00
Cincinnati	5.50- 6.00
Detroit	5.00- 5.50
St. Louis	4.00- 4.50

STEEL RAILS, SHORT □

Birmingham	10.50-11.50
Buffalo	11.75-12.25
Chicago (3 ft.)	11.50-12.00
Chicago (2 ft.)	13.00-13.50
Cincinnati, del.	11.00-11.50
Detroit	12.00-12.50
Pitts., open-hearth, 3 ft. and less	15.50-16.00
St. Louis, 2 ft. & less	11.50-12.00

STEEL RAILS, SCRAP □

Boston	6.50- 6.75
Chicago	10.25-10.75
Pittsburgh	13.25-13.75

STOVE PLATE

Birmingham	5.50- 6.00
Boston, dealers	3.25- 3.75
Buffalo	8.75- 9.00
Chicago, net	6.00- 6.50
Cincinnati, dealers	5.50- 6.00
Detroit, net	6.00- 6.50
Eastern Pa.	8.50- 9.00
N. Y., deal. fdry.	6.00
St. Louis	5.50- 6.00

COUPLERS, SPRINGS □

Buffalo	12.00-12.50
Chicago, springs	11.50-12.00
Eastern Pa.	13.50-14.50
Pittsburgh	15.50-16.00
St. Louis	9.00- 9.50

ANGLE BARS—STEEL □

Chicago	11.50-12.00
St. Louis	9.00- 9.50

RAILROAD SPECIALTIES □

Chicago	11.50-12.00

LOW PHOSPHORUS □ □

Buffalo, billets and bloom crops	11.50-12.00
Cleveland, billet, bloom crops	14.00-14.50
Eastern Pa., crops	13.50-14.00
Pittsburgh, billet, bloom crops	15.50-16.00
Pittsburgh, sheet bar crops	15.00-15.50

FROGS, SWITCHES

Chicago	10.25-10.75
St. Louis, cut	8.50- 9.00

SHOVELING STEEL □ □

Chicago	10.25-10.75
Federal, Ill.	6.75- 7.00
Granite City, Ill.	6.00- 6.50

RAILROAD WROUGHT □

Birmingham	7.00- 8.00
Boston, dealers	6.00- 6.50
Buffalo, No. 1	7.50- 8.00
Buffalo, No. 2	9.75-10.25
Chicago, No. 1, net	9.00- 9.50
Chicago No. 2	10.25-10.75
Cincinnati, No. 2	8.00- 8.50
Eastern Pa.	11.50-12.00
N. Y., No. 1, deal.	7.00- 7.50
St. Louis, No. 1	5.75- 6.25
St. Louis, No. 2	7.50- 8.00

SPECIFICATION PIPE □

Boston	3.00- 3.25
Eastern Pa.	8.50
New York, dealers	3.50- 4.00

BUSHELING □ □

Buffalo, No. 1	8.75- 9.25
Chicago, No. 1	9.50-10.00
Cinci., No. 1, deal.	6.00- 6.50
Cincinnati, No. 2	3.50- 4.00
Cleveland, No. 2	7.00- 7.50
Detroit, No. 1, new	8.00- 8.50
Valleys, new, No. 1	12.00-12.50

MACHINE TURNINGS □

Birmingham	4.50- 5.00
Boston, dealers	1.75- 2.00
Buffalo	4.75- 5.25
Chicago	5.00- 5.50
Cincinnati, dealers	4.00- 4.50
Cleveland	7.00- 7.50
Detroit	5.00- 5.50
Eastern Pa.	5.50- 6.00
New York, dealers	2.00- 2.25
Pittsburgh	8.75- 9.25
St. Louis	3.00- 3.50
Valleys	9.25- 9.75

BORINGS AND TURNINGS □

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Cincinnati, dealers	4.00- 4.50
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
Eastern Pa.	5.00
New York, dealers	1.50- 1.75
Pittsburgh	6.25- 6.75

CAST IRON BORINGS □

Birmingham, plain	4.50- 5.00
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Chicago	6.00- 6.50
Cincinnati, dealers	4.00- 4.50
Cleveland	7.00- 7.50
Detroit	5.50- 6.00
E. Pa., chemical	12.00-13.00
New York, dealers	1.50- 1.75
Pittsburgh	6.25- 6.75
St. Louis	3.00- 3.50

PIPE AND FLUES □ □

Cincinnati, dealers	4.50- 5.00

RAILROAD GRATE BARS □

Buffalo	6.50- 7.00
Chicago, net	5.50- 6.00
Cincinnati	4.50- 5.00
Eastern Pa.	8.50- 9.00
New York, dealers	4.00- 4.50
St. Louis	4.50- 5.00

FORGE FLASHINGS

Boston, dealers	4.75- 5.25
Buffalo	8.50- 9.00
Cleveland	8.50- 9.00
Detroit	7.50- 8.00

FORGE SCRAP

Boston, dealers	4.50- 4.75
Chicago, heavy	11.50-12.00
Eastern Pa.	9.00- 9.50

ARCH BARS, TRANSOMS □

St. Louis	11.00-11.50

AXLE TURNINGS □ □

Boston, dealers	3.00- 3.50
Buffalo	7.00- 7.50
Chicago, elec. fur.	9.50-10.00
Cleveland	7.00- 7.50
Eastern Pa.	9.00- 9.50
St. Louis	6.50- 7.00

STEEL CAR AXLES □ □

Birmingham	10.00-10.50
Boston, ship. point.	10.00-10.50
Buffalo	12.00-12.50
Chicago, net	15.50-16.00
Eastern Pa.	16.50-17.00
St. Louis	12.25-12.75

SHAFTING □ □

Boston, ship. point.	11.25-11.75
Eastern Pa.	16.50-17.00
New York, dealers	10.75-11.25
St. Louis	11.50-12.00

CAR WHEELS □ □

Birmingham, iron	8.50- 9.50
Boston, iron deal.	5.00- 5.50
Buffalo, iron	11.00-11.50
Buffalo, steel	12.00-12.50
Chicago, iron	10.50-11.00
Chicago, rolled steel	11.50-12.00
Cincinnati, iron	8.50- 9.00
Eastern Pa., iron	10.50-11.00
Eastern Pa., steel	13.50-14.50
Pittsburgh, iron	12.00-12.50
Pittsburgh, steel	15.50-16.00
St. Louis, iron	7.50- 8.00
St. Louis, steel	9.50-10.00

NO. 1 CAST SCRAP □ □

Birmingham	8.50- 9.00
Boston, No. 2	6.00
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	9.50-10.00
Buffalo, mach.	10.75-11.25
Chicago, agri. net	8.50- 9.00
Chicago, mach. net	9.50-10.00
Chicago, railroad net	9.00- 9.50
Cinci., mach. cup	9.00- 9.50
Cleveland, cupola	11.50-12.00
Detroit, net	9.50-10.00
Eastern Pa., cupola	11.00-11.50
Pittsburgh, cupola	13.50-14.00
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.00- 8.50
St. L., No. 1 mach.	9.00- 9.50

HEAVY CAST □ □

Boston, del.	5.25- 5.50
Buffalo, break.	8.00- 8.50
Cleveland, break.	8.50- 9.00
Detroit, break.	6.50- 7.00
Detroit, auto net	9.00- 9.50
Eastern Pa.	10.00
N. Y., break. deal.	6.00- 6.25
Pittsburgh	12.00-12.50

MALLEABLE □ □

Boston, consum.	10.00-10.50
Buffalo	10.50-11.00
Chicago, R. R.	12.00-12.50
Cincinnati, agri. del	8.00- 8.50
Cleveland, rail	11.50-12.00
Detroit, auto	10.00-10.50
St. Louis, R. R.	8.50- 9.00
Eastern Pa., R. R.	10.50-11.00

RAILS FOR ROLLING □

5 feet and over

Birmingham	9.50-10.50
Boston, dealers	8.00- 8.50
Buffalo	10.25-10.75
Chicago	11.50-12.00
Eastern Pa.	12.50-13.00
New York, dealer	7.50- 8.00
St. Louis	9.50-10.00

LOCOMOTIVE TIRES □

Chicago (cut)	10.00-10.50
St. Louis, No. 1	10.00-10.50

LOW PHOS. PUNCHINGS □

Buffalo	12.00-12.50
Chicago	11.50-12.00
Eastern Pa.	14.50-15.00
Pittsburgh	14.50-15.00

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper			Straits Tin		Lead	Lead	Zinc	Alumi-		Nickel
	Electro., del. Conn.	Lake, del. Midwest	Casting, refinery	New York Spot	New York Futures	N. Y.	East St. L.	St. L.	num 99%	Antimony Spot, N. Y.	Cath- odes
Dec. 8	9.00	9.12½	7.37½	50.95	51.00	3.50	3.35	3.70	*19.00	13.75	35.00
Dec. 10	9.00	9.12½	7.37½	51.00	51.00	3.50	3.35	3.70	*19.00	13.75	35.00
Dec. 11	9.00	9.12½	7.37½	51.00	51.02½	3.50	3.35	3.70	*19.00	13.75	35.00
Dec. 12	9.00	9.12½	7.37½	50.90	50.90	3.50	3.35	3.70	*19.00	13.75	35.00
Dec. 13	9.00	9.12½	7.37½	50.85	50.87½	3.50	3.35	3.70	*19.00	13.75	35.00
Dec. 14	9.00	9.12½	7.37½	50.90	50.92½	3.60	3.45	3.70	*19.00	13.75	35.00

*Nominal range 19.00c to 21.00c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	□
Baltimore*	2.90c
Boston††	2.95c
Buffalo	3.00c
Chattanooga	3.31c
Chicago	2.95c
Cincinnati	3.15c
Cleveland	2.95c
Detroit	3.03½c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.30c
New York‡(d)	3.22c
Pittsburgh(h)	2.90c
Philadelphia*	2.90c
San Francisco	3.60c
Seattle	3.60c
St. Louis	3.19c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	□
Portland	3.40c
Chattanooga	3.31c
Baltimore*	3.00c
Chicago	2.75c
Cincinnati	3.15c
New York‡(d)	3.32c
Philadelphia*	2.90c
St. Louis	3.19c
Tulsa	3.25c

REINFORC. BARS	□
Buffalo	2.60c
Chattanooga	3.31c
Chicago	2.10c-2.60c
Cleveland(c)	1.97½c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.15c
New Orleans	3.50c
Pitts., plain(h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	3.50c
St. Louis	3.24c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES	□
Baltimore*	3.90c
Boston††	3.17c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland	3.31c
Detroit	3.40c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.37c
Philadelphia*	2.95c
Pittsburgh(h)	3.15c
Portland	3.40c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.55c
St. Paul	3.25c
Tulsa	3.50c

PLATES	□
Baltimore*	2.90c
Boston††	3.18c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland, ¼-in. and over	3.31c
Detroit	3.40c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.40c
Philadelphia*	2.95c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	□
Baltimore*	3.05c
Boston††	3.25c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.00c
Cincinnati	3.20c
Cleveland	3.11c
Det., 8-10 ga.	3.13½c
Houston	3.35c
Los Angeles	3.80c
New Orleans	3.55c
New York	3.27c
Portland	3.75c
Philadelphia*	3.05c
Pittsburgh(h)	2.95c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.29c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	□
Baltimore*†	3.51c
Boston (g)	3.90c
Buffalo	3.25c
Chattanooga	4.21c
Chicago	3.85c
Cincinnati	4.05c
Cleveland	3.91c
Detroit	3.98½c
Los Angeles	4.45c
New York	3.85c
Philadelphia*†	3.55c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	4.09c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	□
Baltimore*†	4.21c
Buffalo	4.00c
Boston (g)	4.60c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.70c
Cleveland	4.61c
Detroit	4.70c
Houston	4.40c
Los Angeles	5.05c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.25c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.79c
St. Paul	4.19c
Tulsa	5.10c

BANDS	□
Baltimore*	3.15c
Boston††	3.25c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.45c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.38½c
Houston	3.25c
Los Angeles	3.90c
New Orleans	3.59c
New York(d)	3.62c
Philadelphia	3.15c
Pittsburgh(h)	3.20c
Portland	3.90c
San Francisco	4.05c
Seattle	3.90c
St. Louis	3.54c
St. Paul	3.20c
Tulsa	3.45c

HOOPS	
Baltimore	2.30c
Boston	4.25c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.45c
Det., No. 14 and lighter	3.38½c
New York	3.62c
Philadelphia	3.40c
Pittsburgh(h)	3.70c
Seattle	5.60c
St. Louis	3.54c
St. Paul	3.75c

COLD FIN. STEEL	□
Baltimore (c)	3.71c
Boston	4.00c-4.50c
Buffalo (h)	3.55c
Chattanooga*	4.06c
Chicago (h)	3.50c
Cincinnati	3.70c
Cleveland (h)	3.50c
Detroit	3.63½c
Los Ang.(f)(d)	4.95c
New Orleans	4.30c
New York	3.92c-4.42c
Philadelphia	3.73c
Pittsburgh(h)	3.45c
Portland (f)	4.75c
San Fran.(f)(d)	5.95c
Seattle (f) (d)	4.75c
St. Louis	3.74c
St. Paul	3.20c
Tulsa	4.65c

COLD ROLL. STRIP	□
Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	3.39c
Chicago	3.27c
Cincinnati(b)	3.42c
Cleveland (b)	3.20c
Detroit	3.33c
New York	4.70c
St. Louis	3.36c

(b) Plus straightening, cutting and quantity differentials.
(c) Plus mill, size and quantity extras.
(d) Minus quant. diff.
(e) New mill classif.
(f) Rounds only.
(g) 50 bundles or over.
(h) Outside delivery, 10c less.

‡Domestic bars.
*Plus quan. extras.
**Under 25 bundles.
*†50 or more bundles.
†New extras apply.
††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 13

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$16.09 3 1 6	$13.21	1 13 0
Basic bessemer	13.59 2 15 0*	12.83	1 12 0
Hematite, Phos. .03-.05	15.44 3 2 6	.....	.....
SEMIFINISHED STEEL			
Billets	$27.17 5 10 0	$18.85	2 7 0
Wire rods, No. 5 gage	38.53 7 16 0	36.08	4 10 0
FINISHED STEEL			
Standard rails	$38.29 7 15 0	$44.10	5 10 0
Merchant bars	1.66c 7 10 0	1.15c to 1.19c	3 2 6 to 3 5 0
Structural shapes	1.63c 7 7 6	1.12c *	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 0 0	1.50c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.04c 9 5 0	2.11c	5 16 0
Sheets, gal., 24 gage, corr.	2.49c 11 5 0	2.36c	6 10 0
Bands and strips	1.88c 8 10 0	1.45c	4 0 0
Plain wire, base	2.04c 9 5 0	1.94c	5 7 6
Galvanized wire, base	2.49c 11 5 0	2.27c to 2.32c	6 5 6 to 6 7 6
Wire nails, base	2.65c 12 0 0	2.09c	5 15 0
Tin plate, box 108 lbs.	$ 4.45 0 18 2	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$16.67 3 9 6(a)	$13.86	210	$14.48	310	$25.31 63
Basic bessemer pig iron	16.67 3 7 6(a)*	12.21	185	12.61	270	27.92 (b)69.50
Furnace coke	4.32 0 17 6	7.92	120	5.14	110	7.63 19
Billets	27.17 5 10 0	28.38	430	20.55	440	38.76 96.50
Standard rails	1.82c 8 5 0	2.08c	694	2.31c	1,100	2.40c 132
Merchant bars	1.90c 8 12 0	1.68c	560	1.16c	550	2.00c 110
Structural shapes	1.93c 8 15 0	1.65c	550	1.16c	550	1.96c 107.50
Plates, †¼-in. or 5 mm.	2.00c 9 1 3	2.10c	700	1.47c	700	2.31c 127
Sheets, black	2.32c 10 10 0§	2.55c	850‡	1.63c	775‡	2.62c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.87c 13 0 0	4.50c	1,500	3.15c	1,500	6.73c 370
Plain wire	2.04c 9 5 0	3.15c	1,050	2.31c	1,100	3.15c 173
Bands and strips	2.07c 9 7 0	1.95c	650	1.47c	700	2.31c 127

*Basic. †British ship-plates. Continental, bridge plates. 24 ga. ‡1 to 3 mm. basic price British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel a del. Middlesbrough. b hematite.
**Gold pound sterling carries a premium of 64.75 per cent over paper sterling.

Bars

Bar Prices, Page 58

Pittsburgh — Although considerably more automobile bar orders are being placed than a month ago, the buying movement is not sustained. Some automobile buyers, while specifying new sizes, are not building up inventories. The carbon bar market is 1.80c, base Pittsburgh, and alloy bars 2.45c, Pittsburgh, and all basing points.

Cleveland—Demand for carbon steel and alloy bars has made a faster comeback than any other finished steel products, except sheets and strip. The Cleveland bar mill now is operating close to 50 per cent. Some good orders have been received from automobile forge shops, tractor manufacturers, road machinery builders, and farm tool plants. A few contracts have been booked for January shipment.

Chicago—Steel bar demand has shown further improvement with the automotive and farm implement industries among the chief supports. While orders from miscellaneous consumers are fairly steady, small lots are involved and little forward buying has appeared.

Boston — Buying is slightly heavier, with forging and alloy bars sharing the improvement with commercial steel bars. Releases by bolt and nut plants and tool makers are better. Buying continues in small lots, covering a broad range of requirements.

New York—Shipment of steel bars are light but better interest is shown in first quarter needs, with some contracts closed. Prices are steady at 2.13c.

San Francisco—Movement of mild steel bars is by no means active, most sales being less than carload lots. Stocks in warehouses are well rounded out. Los Angeles has placed 60 tons of drill steel with the Crucible Steel Co., Pittsburgh.

Plates

Plate Prices, Page 58

Philadelphia—While navy work continues the principal item platemakers report a few fair-size tonnages in other directions. The Reading Co. has curtailed its car repair program, but will require at least 450 tons of plates for work under schedule for January; the Erie ferryboat will take possibly 600 tons of steel, of which the greater proportion will be plates; and about 450 tons of plates will be required for miscellaneous tanks for the Du Pont interests at Edgemoor, Del., on which the fabrication contract has just been let. Recent navy openings have included approximately 2400 tons of black and galvanized plates and sheets for the Brooklyn navy yard, 425 tons of high tensile black plates for the Philadelphia navy yard and 115 tons of miscellaneous work for the navy under schedule 3660. The base price is 1.90c, Coatesville, Pa., or 1.98½c, Philadelphia.

About 300 tons of plates are estimated to be required for two steel coal barges on which the Pennsylvania will open bids Dec. 19.

Pittsburgh—Against an engineers' estimate of $4480 for each of two barges, Dravo Contracting Co., Pittsburgh, last week submitted a low bid of $4980 each for two barges to the Huntington, W. Va., army engineers. Bids to repair two maneuver boats and the United States steamer IROQUOIS will be taken Jan. 3 by Huntington, W. Va., army engineers. An inquiry is being circulated privately for a 195-foot steel barge for a buyer who will use the unit at Lake Charles, La. The plate market is steady on the basis of 1.80c, base Pittsburgh.

Cleveland—Small plate fabricating shops in this district have had an encouraging increase in business, principally for welded bins, hoppers and frames. A few lots of plates have been purchased for ship repair work, and this demand is expected to increase early next year, as some of the steamship companies contemplate extensive repair programs. Tank and boiler fabricators place occasional carloads.

Chicago—Plates continue slow, orders generally being in small lots for miscellaneous uses. Railroad demand still is prospective and the improvement from this source depends on federal aid in equipment building next year.

Boston—Plate buying continues in small miscellaneous lots with few full car releases. Large tank inquiry is light, but includes a 100,000-gallon standpipe for Exeter, R. I., and a 35,000-gallon tank for the Boston navy yard. Plates are steady at 2.20c, Boston.

New York—The plate market is more active for first quarter. The Lehigh Valley has placed the first lot of steel for its repairs to 1350 box cars and will award the remainder as work progresses. The American Locomotive Co., New York, has placed about 100 tons for two streamlined steam engines it is building for the Chicago, Milwaukee, St. Paul & Pacific. Plate requirements for caissons for the New York postoffice have been reduced to 800 tons, with the George J. Atwell Foundation yet to sublet the work. Prospects for improved oil company requirements are brightened by reports the Standard Oil Co. of New Jersey will spend $60,000,000 to $70,000,000 for improvements next year.

Washington—Bureau of supplies and accounts, navy department, will receive bids Dec. 18 for 23,950 pounds of marine boiler steel and 55,300 pounds of grade M black medium steel plate.

Contracts Placed

723 tons, sealing strips, spillway dam, Fort Peck, Mont., general contract to Massman Construction Co., Kansas City, Mo.

450 tons, approximately, miscellaneous tanks, for the Du Pont interests, Edgemoor, Del., to Hammond Iron Works, Warren, Pa.

330 tons, 12-inch sheet steel pipe, Reedsport, Oreg., to Pure Iron Culvert Mfg. Co., Portland, Oreg.

175 tons, water tank, Pensacola, Fla., to R. D. Cole Mfg. Co., Newnan, Ga.

162 tons, penstock, Boulder dam, Boulder City, Nev., specification 633-D., to unnamed interest.

150 tons, tank, Hub Oil Co., Rochester, N. Y., to Buffalo Tank Corp., Lackawanna, N. Y.

125 tons, 363 special class steel plate buoys, welded construction, bureau of lighthouses, Staten Island, N. Y., to William B. Scaife & Sons Co., Pittsburgh.

115 tons, 75 buoys, including can, nun, cone, bell and whistle types, bureau of lighthouses, Staten Island, N. Y., to Tippett & Wood, Phillipsburg, N. J.; Union Boiler & Mfg. Co., Lebanon, Pa., and Biggs Boiler Works Co., Akron, O.

Contracts Pending

425 tons, high tensile black plates, for work on United States cruiser WICHITA, under construction at the Philadelphia navy yard; bids opened.

192 tons, 18-inch, 14-gage welded pipe, specification 1564, Los Angeles; bids opened.

115 tons, galvanized plates and sheets, schedule 3660, for the navy, Central Iron & Steel Co., Harrisburg, Pa., low on most, with Penn Galvanizing Co., Philadelphia, Alan Wood Steel Co., Conshohocken, Pa., and American Sheet & Tin Plate Co., Pittsburgh, low on the remaining three items; Central Iron & Steel Co. also is low on the black plates, lot 152, under this schedule.

100 tons, 200,000-gallon storage tank, St. George, Utah; bids soon.

Unstated tonnage, two steel service barges for army engineers at Huntington, W. Va.; Dravo Contracting Co., Pittsburgh, low at $4980 for each barge, followed by Midland Barge Co., Midland, Pa., $5600; Howard Shipyard & Dock Co., Jeffersonville, Ind., $6170; McClintic-Marshall Corp., Bethlehem, Pa., $7350; Nashville Bridge Co., Nashville, Tenn., $8760, and Marietta Mfg. Co., Point Pleasant, W. Va., $10,950.

Sheets

Sheet Prices, Page 58

Pittsburgh — Effective immediately drawing extras of $5 a ton, or 25 cents per 100 pounds, have been eliminated on certain automotive parts using cold finished steel sheets. The parts so affected are two-piece backs, doors and flat-cowl side panels. These exceptions join other automobile parts exemptions from the drawing extras which latter have been observed for some time. With considerable more automotive buying of full finished sheets, the average of sheet mill operations has expanded to around 42 per cent for the industry. In addition, there is a fair amount of miscellaneous sheet steel demand for black and galvanized sheets to be used in drums, as well as a good demand from the farm implement manufacturers. Over 500 tons of high-tensile copper chrome sheets, mainly in 3/32-inch thicknesses, will be taken by Pressed Steel Car Co. to complete an order the latter took last week for 100 hopper cars for the Bessemer & Lake Erie railroad. Base prices are firm.

Cleveland—Sheet demand shows considerable improvement, production in this district last week increased to 50 to 60 per cent, and scheduled at this rate this week. Specifications from automobile manufacturers and body builders dominate, and while orders for 1000-ton lots are more frequent, buying on a much larger scale is anticipated as an early development. The Fisher Body Co.'s plant has released substantial tonnages for Chevrolet bodies. Practically all current orders are for immediate delivery. Refrigerator manufacturers are getting into production on new models, and demand from range and washing machine manufacturers has improved.

Chicago—Further expansion in automotive sheet demand is noted and indications point to additional improvement during the next six weeks. Farm implement manufacturers remain one of the leading users in this district while miscellaneous sheet buying also is fairly steady. Some decrease is anticipated over the balance of the month in the latter, but prospects for renewed activity next quarter generally are favorable. Forward buying for the new quarter is light, except in instances such as in the automotive industry where requirements are fairly well defined.

Boston—Demand for blue annealed sheets is slightly smaller, but activity in other finishes is unchanged. Buying continues close to requirements, but covers a rather broad range of consumers. Volume this month will be somewhat below that of November with most sellers.

New York—Sheet specifications reflect the approaching holiday season, with volume the lightest in some time. As consumers' stocks generally are low, sellers look for a good rebound after the holiday and inventory seasons. Prices are unchanged.

Philadelphia — Substantial orders for autobody sheets by a local fabricator here is outstanding in a rather quiet market. Sellers report the holiday lull as already in evidence, and look for little improvement before the middle of January. Prices are unchanged.

Cincinnati—Sheet mills in this district stepped up production schedules above 50 per cent to meet an improved demand, the gains being chiefly in automotive buying. Miscellaneous demand also is strong, with refrigerator manufacturers showing increased activity.

Birmingham, Ala. — Sheet mills have maintained the fairly active rate set several months ago, and there has been steady shipment of the product, the agricultural section taking a considerable portion of the tonnage.

Seattle—While no large tonnages are moving, there is a fair demand for sheets, particularly light galvanized and black, required in repair jobs. The market is somewhat more active than normal for the season.

Transportation

Track Material Prices, Page 59

Placing of 46,583 tons of rails and fastenings by the Atchison, Topeka & Santa Fe and the Northern Pacific leads interest in the railroad market. The Santa Fe has distributed orders for 25,883 tons of rails and 10,700 tons of fastenings and the Northern Pacific has ordered 10,000 tons of rails.

Inquiry from the Van Sweringen lines for about 94,000 tons of rails is expected at any time, as recently noted. Lehigh Valley may buy about 25,000 tons of rails for 1934. Chicago, Burlington & Quincy plans to lay about 100 miles of rails in 1934. It has on hand about 7000 tons of the 17,500 tons of 112-pound rails necessary for this program.

Pressed Steel Car Co., Pittsburgh, has been awarded 100 hoppers by Bessemer & Lake Erie, a Steel corporation subsidiary, of 69½ tons capacity, to use sheets and plates of a high-tensile copper-chrome alloy.

Gold Coast railroad, Port Orford, Oreg., has asked the interstate commerce commission for permission to construct 90 miles of main line and five miles of siding between Port Orford and Leland, Oreg., connecting with the Southern Pacific railroad at Leland.

The Pennsylvania has let contracts for laying 4500 feet of submarine cable at river crossings along its electrified line between New York and Washington.

Car Orders Placed

Bessemer & Lake Erie railroad, 100 hopper cars to Pressed Steel Car Co., Pittsburgh.

Chicago, Burlington & Quincy, stainless steel streamlined car for Zephyr train, to Edward G. Budd Mfg. Co., Philadelphia.

Rail Orders Placed

Northern Pacific, 10,000 tons; 6000 tons to Illinois Steel Co., Chicago, 3500 tons to Bethlehem Steel Co., 500 tons to Colorado Fuel & Iron Co., Denver.

Atchison, Topeka & Santa Fe, 25,883 tons; 22,867 tons to Colorado Fuel & Iron Co., Denver, 1439 tons to Illinois Steel Co., Chicago, 917 tons to Bethlehem Steel Co., Bethlehem, Pa., and 660 tons to Inland Steel Co.; various track accessories totaling 10,700 tons also placed with a number of producers.

Locomotives Pending

Bureau of supplies and accounts, navy department, Washington, one diesel-electric switching locomotive for Mare Island, Calif.; bids Jan. 4.

Cold Finished

Cold Finished Prices, Page 59

Pittsburgh—Although some buyers are entering specifications in representative lots of 20 to 30 tons, their specifications are far from being sustained. Obviously there is little incentive for buyers to speculate with stocks of cold-drawn bars as 2.10c, Pittsburgh base, is firmly established for first quarter. The Detroit district market is firm and unchanged for the first quarter at 2.30c, Detroit, or 2.35c, eastern Michigan. Agricultural implement makers still are fairly prominent among cold-drawn buyers.

Quicksilver

New York—Quicksilver prices are steady. Scattered buying is reported but the general tone of the market is quiet. Round lots of 100 flasks or more are quoted down to $72.50, a flask of 76 pounds, and lots of 15 to 24 flasks are steady at $74 a flask.

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Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories at Bridgeville, Pa.

Shapes

Structural Shape Prices, Page 58

New York—Slightly heavier structural lettings are topped by 3000 tons for a seven-story store, Manhattan, the first sizable award for such a commercial structure in many months. Bridge requirements lead inquiry. Bids close Dec. 27 on field inspection of 16,200 tons for the downtown Manhattan federal building.

Pittsburgh—Plans on three Pennsylvania state highway bridges were released last week requiring the following lots of fabricated structural steel: 458 tons in Tioga county, 286 tons in Bedford county, and 220 tons in Montgomery county. Bids will close Dec. 28, at Harrisburg, Pa. Low bid of Dravo Contracting Co., Pittsburgh, recently on the 3700-ton Gallipolis, O., dam in the Ohio river at Hogsett, W. Va., was $3,117,518, but exceeded the engineers' estimate. Merritt, Chapman & Whitney, New York, bid $3,223,547.

Cleveland—Small industrial building projcets being figured here total about 500 tons. The Hinde & Dauch Paper Co., Sandusky, O., awarded 50 tons to a Detroit fabricator. The Accurate Parts Mfg. Co., Cleveland, has postponed action on 150 tons for a building at Lorain, O. Chesapeake & Ohio railroad this week is to award 335 tons for a bridge at Newport News, Va. State bridge work calls for several small lots.

Chicago—Structural awards and inquiries lack improvement, with public structures supplying practically all of recent business. Heading awards is 1275 tons for a bridge at Alexandria, La. Bids on the Mississippi river dam at Guttenberg, Iowa, are expected to be taken at Rock Island, Jan. 9. Awarding of over 6000 tons of plates, shapes, piling and reinforcing bars for the Muscatine, Iowa, dam awaits the placing of the general contract. Inquiries for private construction lack improvement.

Philadelphia—Except for an inquiry for several hundred tons for the government aircraft factory here, on which specifications are expected out this week, little structural tonnage is pending in this district. The base price continues at 1.90c, Bethlehem, Pa., or 2.00½c, Philadelphia.

San Francisco—A fire at the Alameda, Calif., plant of the Pacific Coast Steel Corp., where thousands of tons of steel for the Golden Gate bridge are stored, caused damage estimated at over $50,000, but will not delay erection of the bridge. Shape awards for the week totaled 1100 tons. Awards on 2300 tons for the Hall of Records, Oakland, Calif., and on 3000 tons of sheet piling for a bulkhead at Government Island, Calif., are expected this week.

Seattle—Interest was centered in the opening of several bridge jobs, and the award to the Virginia Bridge & Iron Co., Roanoke, Va., of 730 tons for the navy hangar at Pearl Harbor, T. H.

More than 250 tons are involved in the navy pier at Pearl Harbor, bids Dec. 28. Tenders for three bridges over the Tualatin river, Washington county, Oregon, will be received Dec. 20.

Shape Contracts Placed

3000 tons, seven-story store, S. H. Kress & Co., Fifth avenue and Thirty-Ninth street, New York, to Post & McCord, New York. American Bridge Co. will fabricate the shapes; Barr, Irons & Lane, Inc., New York, general contractor.

1275 tons, bridge, Alexandria, La., to Nashville Bridge Co., Nashville, Tenn.

525 tons, steel towers for department of agriculture to Aeromotor Co., Chicago.

730 tons, navy hangar Pearl Harbor, T. H., to Virginia Bridge & Iron Co., Roanoke, Va.; Pioneer Construction Co., Seattle, general contractor. Reported last week to unstated fabricator.

470 tons, bridge NRH 21-B, McIntosh county, Oklahoma, to Capital Steel & Iron Co., Oklahoma City.

300 tons, school, Santa Ana, Calif., to Consolidated Steel Corp., Los Angeles.

300 tons, bridge, Boling, Tex., to McClintic-Marshall Corp., Bethlehem, Pa.

275 tons, two 165-foot high truss bridge spans, Buffalo county, Wisconsin, to Milwaukee Bridge Co., Milwaukee.

270 tons, state prison addition, Bordentown, N. J.; awarded through N.A.K. Bugbee, Trenton, N. J., contractor, to American Bridge Co., Pittsburgh.

210 tons, Shurtleff school, South Boston, Mass., to West End Iron Works, Cambridge, Mass.; Rugo Construction Co., Boston, general contractor.

Shape Awards Compared

	Tons
Week ended Dec. 15	**9,408**
Week ended Dec. 8	**5,551**
Week ended Dec. 1	**25,385**
This week in 1933	**35,170**
Weekly average, 1933	**9,296**
Weekly average, 1934	**16,836**
Weekly average, November	**22,332**
Total to date, 1933	**770,011**
Total to date, 1934	**841,800**

210 tons, bridge, Red Willow county, Nebraska, to St. Joseph Structural Steel Co., St. Joseph, Mo.

205 tons, state bridge FAP 77, Montana, to Minneapolis-Moline Power Implement Co., Minneapolis.

200 tons, state highway bridge, Springfield, Ill., to McClintic-Marshall Corp., Bethlehem, Pa.

200 tons, state bridges, West Virginia, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

175 tons, monorail superstructure, DuPont Rayon Co., Ampthill, Va., to McClintic-Marshall Corp., Bethlehem, Pa.

170 tons, bridge, Kaufman, Ill., to McClintic-Marshall Corp., Bethlehem, Pa.

165 tons, tunnel ribs, metropolitan water district, Los Angeles, specification M-2032, to Commercial Shearing & Stamping Co., Youngstown, O.

165 tons, building, E. I. DuPont DeNemours & Co., Belle, W. Va., to Ingalls Iron Works, Verona, Pa.

150 tons, Nonesemond river bridge, Suffolk, Va., to Virginia Bridge & Iron Works Co., Roanoke, Va.; through Tidewater Construction Co., Norfolk, Va.

150 tons, bridge, Delaware & Hudson railroad, Duanesburg, N. Y., to American Bridge Co., Pittsburgh; Wilson & English Construction Co., New York, general contractor.

140 tons, I-beams, Mare Island navy yard, Calif., schedule 3661, to unnamed interest.

123 tons, state bridge, Tioga county, New York, to American Bridge Co., Pittsburgh; through J. F. Morgan Co., Olean, N. Y.

115 tons, postoffice, Moline, Ill., to Fort Pitt Bridge Works, Pittsburgh; through Lundoff-Bicknell Co., Cleveland, general contractor.

105 tons, Central school, Interlaken, N. Y., to Smith & Caffrey, Rochester, N. Y.

105 tons, bridge, Golden, Jefferson county, Colorado, to Minneapolis-Moline Power Implement Co., Minneapolis.

105 tons, bridge NRH 405-E, Elk county, Kansas, to St. Joseph Structural Steel Co., St. Joseph, Mo.

100 tons, administration building, Compton junior college, Compton, Calif., to Minneapolis-Moline Power Implement Co., Minneapolis, Minn.

100 tons, prison, Oahu, T. H., for government, to unnamed interest.

100 tons, shapes and bars, state bridge, Springfield, Vt., to American Bridge Co., Pittsburgh, and Joseph T. Ryerson & Sons Inc., Chicago; through T. J. Harvey & Son, Adams, Mass.

Shape Contracts Pending

3000 tons, sheet steel piling, bulkhead, Government Island, Oakland, Calif.; bids opened.

2300 tons, Hall of Records, Oakland, Calif.; bids opened.

1850 tons, Monrovia & Pasadena tunnel, metropolitan water district, Los Angeles; bids opened.

1200 tons, Richmond, Va., postoffice; Spence Construction Co., Lansing, Mich., low on general contract.

1000 tons, sewage disposal plant, Jackson, Mich.

789 tons, bridge, Fox Lake, Ill.; McClintic-Marshall Corp., Bethlehem, Pa., low.

773 tons, including 250 tons of sheet

steel piling, Rye Patch dam, Lovelock, Nev.; general contract to J. A. Terteling & Sons, Boise, Idaho.

500 tons, viaduct, Norfolk & Western railroad, Norfolk, Va.

458 tons, 1400-foot, 3-span through truss bridge, Lawrence township, Tioga county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 28, including 53 tons of plain steel bars.

450 tons, public school 48, South Jamaica, Queens, New York; Lustig & Weil, New York low.

380 tons, shapes and plates, drum gates and outlet valves, placing only, O'Shaughnessy dam enlargement, Hetch Hetchy project, San Francisco; bids Jan. 8.

380 tons, textile plant addition for the Blue Ridge Co., Glasgow, Va.; general contract awarded to John J. Pettijohn, Lynchburg, Va.

375 tons, storm sewers, Birmingham, Ala.

350 tons, auditorium, Santa Barbara, Calif.; bids soon.

350 tons, auditorium, Fresno, Calif.; bids soon.

302 tons, steel bridge over Feather river, Plumas county, California; bids opened.

300 tons, building, Celanese Corp., Cumberland, Md.

300 tons, building for state hospital, Taunton, Mass.; Thomas O'Connor & Co., Boston, low.

293 tons, steel bridge in Monterey county, California; bids Dec. 26.

286 tons, 2970-foot, 4-span plate girder bridge, Liberty township, Bedford county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 28.

250 tons, or more, navy pier and warehouse, Pearl Harbor, T. H.; bids Dec. 28.

250 tons, bridge, Meridian, Miss.

220 tons, 162-foot plate girder bridge, Lower Providence township, Montgomery county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 28.

170 tons, highway bridge, Medford, Mass.

170 tons, postoffice and court house, Abilene, Tex., A. Smith & Co., Chicago, low on general contract.

150 tons, high school, Butte, Ont.; bids soon.

140 tons, special tees, bureau of supplies and accounts, navy department, for two submarines being built at Portsmouth, N. H., and one at Mare Island, Calif.

130 tons, highway bridge, Holyoke, Mass.

117 tons, Kings river bridge, Fresno county, California, for state; bids opened.

110 tons, shapes and bars, Sycamore street school, Lowell, Mass.; Steed-Barber Corp., Boston, low on general contract.

110 tons, Napier bridge, Braxton county, West Virginia; bids Dec. 18.

100 tons, state prison at Folsom, Calif.; Palm Iron Works, Sacramento, Calif., low.

100 tons, extension to berth No. 177, Los Angeles; bids opened.

100 tons, three spans Nizina river, Alaska, for Alaska road commission; Stupp Bros. Bridge & Iron Co., St. Louis, low.

Westinghouse Air Brake Co., Wilmerding, Pa., has shipped two air compressors for the Alma, Wis., lock and dam No. 4 and the Fountain City, Wis., dam No. 5.

INSURE UNIFORM HEAT, FUEL SAVING AND ACCURATE TEMPERATURE CONTROL

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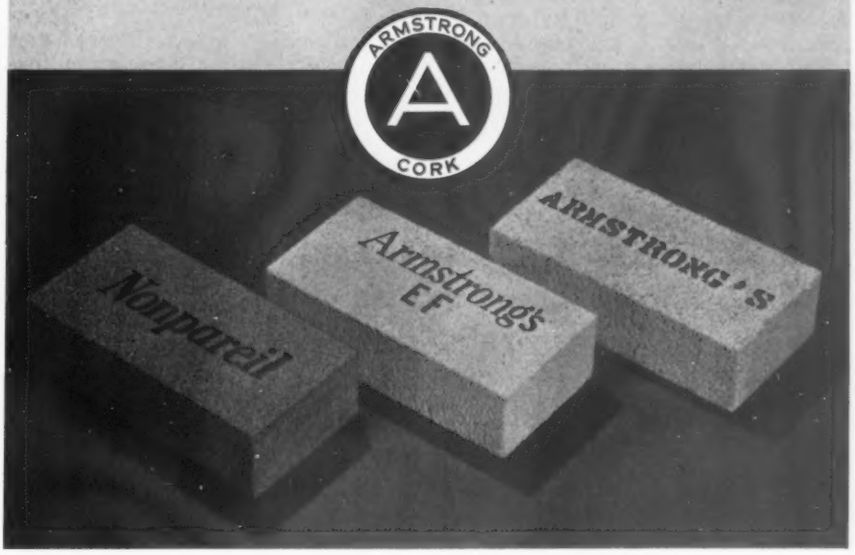

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All three brick are available in standard fire brick shapes and in special shapes up to 12″ x 24″ x 4½″. For details and samples of these brick, write Armstrong Cork & Insulation Company, Insulation Division, 985 Concord Street, Lancaster, Pennsylvania.

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HIGH TEMPERATURE BRICK

Armstrong's • **EF** • ***Nonpareil***

Reinforcing

Reinforcing Bar Prices, Page 59

Pittsburgh—Bids will be taken Dec. 28 by the state highway department at Harrisburg, Pa., on the following lots of plain steel bars: 107,312 pounds for Tioga county, 89,375 pounds for Bedford county, 58,652 pounds for Lebanon county, and 55,371 pounds for Lancaster county. Truscon Steel Co., Youngstown, O., has been awarded 800 tons of bars for a Georgia state penitentiary. Dravo Contracting Co., Pittsburgh, is low on the Gallipolis, O., dam general contract, which requires about 800 tons of bars.

Cleveland—Contractors are slow to close on several fairly good tonnages of concrete bars that have been pending for several weeks. An award of 138 tons for sludge basins for a Cleveland sewage disposal plant is indicated for this week. Demand for state road work is light.

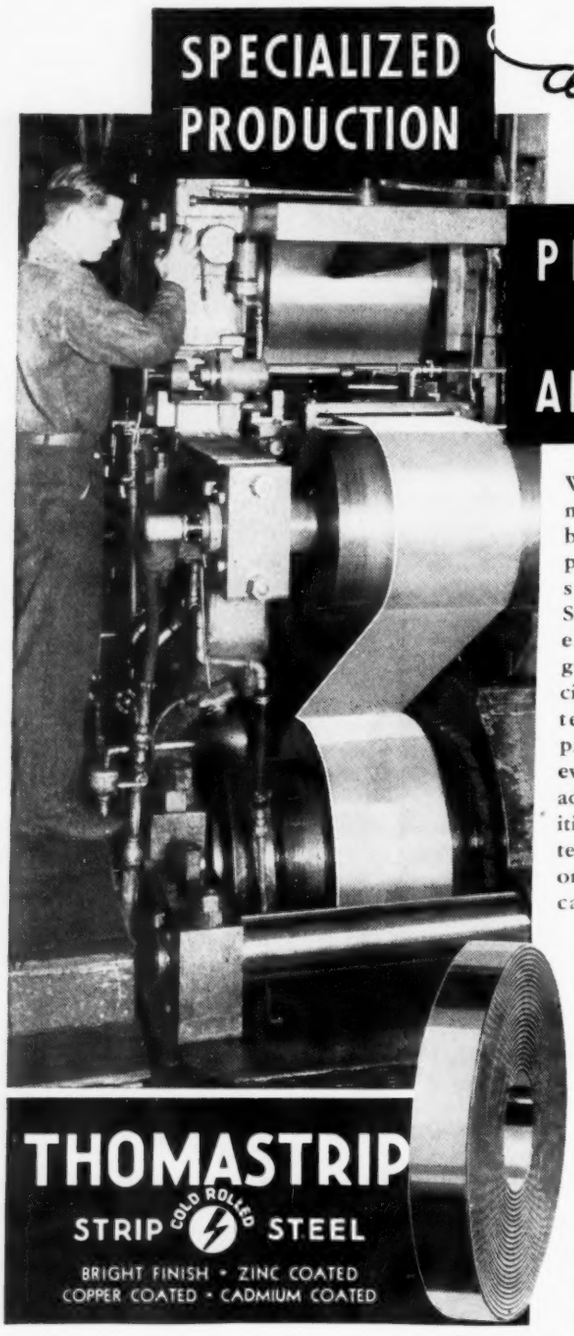
Chicago—Bids open Jan. 9 at Rock Isand, Ill., on 980 tons of bars for the Guttenberg, Iowa, dam. Awarding of 1250 tons for the Muscatine, Iowa, dam awaits the placing of the general contract. New inquiries in the Chicago district include 650 tons for the Chicago sanitary district. Bids recently were opened by the Illinois highway department on various bridges, the largest being one at Fox Lake requiring 175 tons. General contract for the main spillway of the Ft. Peck, Mont., dam, requiring 18,000 tons of bars, has gone to the low bidder. Orders include 300 tons for a Cedar Rapids, Iowa, grain elevator.

Boston — Reinforcing steel bar awards total several hundred tons, including 200 tons for a sewage disposal plant at Providence, R. I. Approximately 500 tons pending for bridges is increased slightly by several small Connecticut state bridges and highway projects closing Dec. 17.

New York—Award of 625 tons for Randalls Island and Little Hell gate piers, Tri-boro bridge here, is held up by delay in the general contract. While several thousand tons of bars and highway mesh pend in the district, contractors are slow to close. Cut lengths, billet bars, are unchanged at 2.48c, delivered to the job in the New York district in car lots.

Philadelphia—Demand for reinforcing bars is principally for Pennsylvania state road work. Bids were opened Dec. 14, on one lot of about 200 tons. In some quarters specifications are expected out this week for the government aircraft factory here, requiring 450 tons of reinforcing bars in addition to a sizable tonnage of structurals. Billet steel bars, cut lengths, are unchanged at 2.05c, Pittsburgh, or 2.34c, Philadelphia.

San Francisco — Featuring the market is the general contract award for 18,000 tons of reinforcing bars and 723 tons of plates for sealing



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Specialized Producers of
COLD ROLLED STRIP STEEL

Concrete Awards Compared

	Tons
Week ended Dec. 15	3,162
Week ended Dec. 8	2,230
Week ended Dec. 1	1,997
This week in 1933	12,137
Weekly average for 1933	3,232
Weekly average 1934	4,244
Weekly average, November	1,695
Total to date, 1933	189,768
Total to date, 1934	212,213

strips on the Fort Peck spillway dam, Montana, placed with the Massman Construction Co., Kansas City, Mo., at $7,133,005. Other awards did not exceed 100-ton lots. To date this year 115,825 tons have been booked. Important new inquiries include 1415 tons for the metropolitan water district, Los Angeles, and 475 tons for the enlargement of the O'Shaughnessy dam, Hetch Hetchy project, San Francisco. Pending business aggregates over 25,000 tons.

Seattle—J. A. Tertelling & Son, Boise, Idaho, has been awarded the general contract for the reclamation Rye Patch dam, Nevada, at $256,322. This project involves 350 tons of reinforcing, 255 tons of plates, and 250 tons steel sheet piling. The same firm is low at $123,894 for a unit of the Owyhee irrigation project, Oregon and Idaho, involving 70 tons of reinforcing, installing gates, hoists and miscellaneous metal structures.

Reinforcing Steel Awards

800 tons, Georgia state penitentiary, to Truscon Steel Co., Youngstown, O., through Struck Construction Co., Louisville, Ky.

600 tons, federal building, New York, to Concrete Steel Co., New York; through George J. Atwell Foundation.

575 tons, Hampton avenue viaduct, St. Louis, 432 tons to Laclede Steel Co., and 143 tons to Missouri Rolling Mills Corp., both St. Louis.

300 tons, grain elevator, Cedar Rapids, Iowa, to Inland Steel Co., Chicago.

225 tons, Shurtleff school, South Boston, Mass., to Northern Steel Co., Boston; Rugo Construction Co., Boston, general contractor.

200 tons, sewage disposal plant, Field's Point, Providence, R. I., to Barker Steel Co., Boston; Tucker Construction Co., Providence, general contractor.

187 tons, including 20 tons of steel sheet piling, grade crossing approaches, Elmira, N. Y., to Kalman Steel Corp., Bethlehem, Pa.; Warren Bros. Roads Co., Cambridge, Mass., general contractor.

175 tons, tire store and factory branch, Goodyear Tire & Rubber Co., Baltimore, to Dietrich Bros., Baltimore; M. A. Long Co., Baltimore, general contractor.

100 tons, school, Sebastopol, Calif., to unnamed interest.

Unstated tonnage, four story addition, Globe Brewing & Mfg. Co., Baltimore, to Kalman Steel Corp.; Price Construction Co., Baltimore, general contractor.

Reinforcing Steel Pending

18,000 tons, spillway dam, Fort Peck, Mont.; general contract to Massman Construction Co., Kansas City, Mo.

4286 tons, specification 82, metropolitan water district, Los Angeles; bids opened.

1415 tons, specification M-2033, bid No. 30170, metropolitan water district, Los Angeles; bids opened.

1000 tons, Hall of Records, Oakland, Calif.; bids opened.

980 tons, dam, Guttenberg, Iowa; bids Jan. 9 to United States engineers, Rock Island, Ill.

800 tons, Gallipolis, O., dam; Dravo Contracting Co., Pittsburgh, low on general contract.

650 tons, southwest sewer, contract No. 2, Chicago; bids Dec. 27.

475 tons, enlargement of O'Shaughnessy dam, Hetch Hetchy project, San Francisco; bids Jan. 1.

350 tons, Rye Patch dam, Nevada; J. A. Tertelling & Son, Boise, Idaho, general contractor.

175 tons, state bridge, Fox Lake, Ill.

155 tons, four state highway projects, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 28, on the following lots: 107,312 pounds of plain steel bars for Tioga county work; 89,375 pounds, Bedford county; 58,652 pounds, Lebanon county, and 55,371 pounds, Lancaster county.

100 tons, New Jersey state road work, on which bids will be opened at Trenton, Dec. 17.

Unstated tonnage, sewage treatment plant, Michigan City, Ind.; bids Dec. 20.

Unstated tonnage, Ashland avenue bridge approach, Chicago; bids Dec. 20.

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Pipe

Pipe Prices, Page 59

Pittsburgh—Some fair-size specifications for mechanical tubing have been issued by several automotive buyers and include orders for alloy mechanical tubing to be used in front axles on a wider scale than a year ago. Standard pipe continues to make up the majority of the present shipments with practically no interest being shown in line pipe or small feeder lines. All pipe discounts are holding steady.

Chicago—Cast pipe orders and inquiries are few and only small tonnages are involved. Inquiries have yet to be received for additional pipe required in the Chicago sanitary district, although this work is proceeding steadily and additional pipe buying is in prospect. Shipments still are delayed on a number of orders placed during the past several months. Cast pipe prices are steady.

Boston—Merchant steel pipe demand is steady. Cast pipe inquiry is light, also awards, the latter including an unstated tonnage for St. Albans, Vt., to the Central Foundry Co., Birmingham, Ala. In connection with a sewage disposal plant at Providence, R. I., a Newark, N. J., foundry booked 750 tons of columns and miscellaneous iron castings.

New York—Bids are in on 1100 tons, 24-inch cast pipe for Watervliet, N. Y., and several hundred tons have been awarded for White Plains, N. Y. Inquiry is light, however, with buying largely in small orders.

Philadelphia—District skelp mills have booked a substantial tonnage of casing for oil fields. Sun Oil Co., this city, has officially announced the placing of 6-inch steel pipe with German producers, first noted in the Nov. 19 issue of STEEL. Explaining the transaction, the company said that through its lubricant trade in Germany it had accumulated a considerable credit, which would not be liquidated because of the German restrictions on foreign exchange, hence, the purchase of pipe from Germany. The announcement set the total at 3750 tons, against 5300 tons originally reported. The pipe is for a 100-mile gas line from Marcus Hook, Pa., to tidewater on the north Jersey coast, with shipments to begin next month.

Birmingham, Ala. — Indications point to steady production until the close of the year. New business is not coming in as actively as had been anticipated.

San Francisco—Demand for cast iron pipe is quiet, and little new business is expected to be placed during the remainder of the year. Bids opened on Jan. 8 for 320 tons of 1-inch tubing and 2 to 8-inch wrought steel pipe for the enlargement of O'Shaughnessy dam, Hetch Hetchy project, San Francisco.

Seattle—Awards are small and new specifications are lacking. Supply houses are selling small lots out of stock, there being practically no mill business at present. Norris Bros., Burlington, Wash., were awarded the contract at $9697 for the Naches, Wash., city pressure irrigation system. Seattle has placed with local wholesalers contracts for 16,000 feet of 2 to 6-inch galvanized wrought iron, galvanized steel and pre-caulked pipe and accessories.

Cast Pipe Placed

1500 tons, Pensacola, Fla., to American Cast Iron Pipe Co., Birmingham, Ala.
231 tons, 3 to 6-inch, Pine View dam, Ogden, Utah, to unnamed interest.
300 tons, Elba, N. J., to R. D. Wood &

FORTY-EIGHT YEARS OF WELDING EXPERIENCE

DON'T *fumble* WITH RIVETS ON NON-FERROUS METALS

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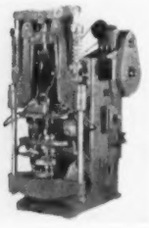

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Thomson-Gibb Electric Welding Company
163 Pleasant Street, Lynn, Mass.

Gentlemen:

☐ Please ask your nearest engineer to arrange for an appointment at our plant.
☐ Please MAIL information on the welding of

Product..... Metal.....

Approximate dimensions.....

Desired production per hour.....

6071

Co., Florence, N. J.
227 tons, 4 to 8-inch, class 150 and 200, Santa Monica, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.
225 tons, sewage disposal plant, Field's Point, Providence, R. I., to United States Pipe & Foundry Co., Burlington, N. J.; Tucker Construction Co., Providence, general contractor. Foran Foundry & Mfg. Co., New York, awarded 750 tons of cast iron columns and castings.
180 tons, Deer Lodge, Mont., to unnamed interest.
163 tons, White Plains, N. Y., to Donaldson Iron Works, Emaus, Pa.
120 tons, Modesto, Calif., allocated as follows: 60 tons to United States Pipe & Foundry Co., Burlington, N. J., and 60 tons to Grinnel Co. of the Pacific, San Francisco.

Cast Pipe Pending

553 tons, 4 to 8-inch, Mountain House, Idaho; bids soon.
210 tons, 2 to 8-inch, Hot Springs, Mont.; bids in.
126 tons, 4 to 10-inch, Porterville, Calif.; bids in.
100 tons, 3 and 4-inch, St. George, Utah; bids soon.
Unstated tonnage, 1776 feet of 6, 8 and 12-inch, Yakima, Wash.; bids Dec. 18 to N. A. Gilman.

Steel Pipe Placed

100 tons, Shaker Heights Country club, Cleveland; distributed to Youngstown Sheet & Tube Co., Youngstown, O., and National Tube Co., Lorain, O.

Wire

Wire Prices, Page 59

Pittsburgh — Spring, spoke and plain manufacturing wire have continued to show considerably more activity by comparison with merchant wire products. In the latter group, nails, fence wire and staples continue to lag. Most of the increase in manufacturers' wire is attributable to the automotive industry. Wire prices are steady and unchanged.

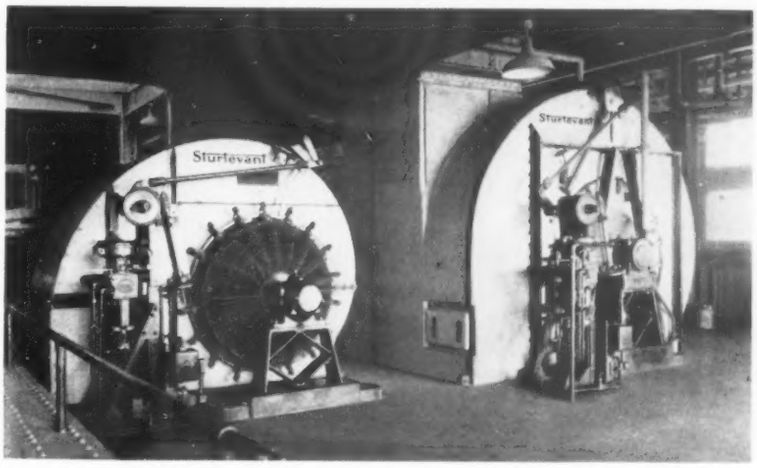
National Electric Products Corp., Pittsburgh, has been awarded a contract for 9700 feet of electric cable for the Montgomery Island locks on the Ohio river on a bid of $2486.20. Bids on 650 feet of electric cable are being taken Dec. 17 by the Pittsburgh army engineers.

Cleveland—Carload orders for wire and wire rods are becoming more frequent. Nut and bolt manufacturers have increased production, due mainly to automotive buying, and are more active in the market. Wire manufacturers anticipate important gains in tonnage for the agricultural districts early next spring.

Chicago — Wire demand is maintaining recent gains, business the past week showing improvement over conditions a month ago. Orders principally are for prompt needs with consumers slow to contract for first quarter requirements. Despite this situation the outlook is regarded as favorable in view of expanding consumption in the automotive industry and gains in needs of miscellaneous users of manufacturers' wire.

Boston—Increase in small orders covering a broad range of wire products has helped operations slightly in some wire drawing departments. More pressure for delivery is a factor indicating current buying is for actual manufacturing needs. There is no advance buying. Operations in the Worcester district are aided by cable and rope requirements for the Hell Gate suspension span, Tri-boro bridge, New York. Effective Dec. 18, a price of 5.00c, Worcester, Mass., has been filed for button eye wire for first quarter.

Instant Response to every DRAFT DEMAND



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Air pressure and volume automatically regulated by movable vanes in fan inlets

These Sturtevant Draft Fans respond *automatically* and *instantly* to even slightest variations in air pressure and volume requirements.

Installed in the fan inlets, movable vanes regulate air pressure and volume by controlling air distribution to the fan wheels. They are operated by a combustion control which accurately follows boiler steam demands.

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Sturtevant DRAFT FANS

DRAFT FANS . TURBINES . GEARS . ECONOMIZERS . AIR HEATERS

Strip Steel

Strip Prices, Page 59

Pittsburgh—Hot-rolled strip demand, continuing at a level sufficient to engage producers at 35 to 40 per cent of capacity, exhibits a trend which should result in further improvement. Cold-rolled strip steel is coming in for only a share of this gain. Prices are steady at 1.85c, Pittsburgh, for hot strip and 2.60c, Pittsburgh or Cleveland, for cold strip.

Cleveland—Strip mill operations here last week were increased to 50 per cent, largely due to increased specifications from automobile manufacturers and partsmakers. A leading producer reported the best week's tonnage since last July.

Chicago—Moderate improvement is noted in automotive strip orders and this is expected to increase steadily. Orders from other sources are well maintained. Forward buying is restricted with most orders recently for prompt needs.

Boston—Cold-rolled strip demand is unchanged. Automobile partsmakers are fairly active buyers. Most incoming volume is for narrower widths. Prices are firm and unchanged at 2.80c, Worcester, for cold-rolled.

Philadelphia—Year-end dullness is becoming increasingly pronounced in strip, with sellers expecting little improvement before the latter part of January. Consumers' stocks generally are low and sellers see this a strong reason for improvement in first quarter. Hot strip is 2.14c, Philadelphia, and cold strip, 2.89c.

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GARAGE IN CONNECTION

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DETROIT

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 59

Most producers of bolts and nuts are now falling in line with the recent 10 per cent increase in prices, making the market on carriage and machine bolts 70-10-10 off list. However, this market will carry more significance with the extension of contracts into the first quarter. Practically no change is noted in rivets at 2.90c, Pittsburgh or Cleveland, 3.00c, Chicago, for large structural and 70-5 off for small sizes. There has been no change in wrought washers, quoted at 6.00c off list. Square head set screws have been advanced 10 per cent.

Increasing specifications are being received from automobile manufacturers, with little improvement in other lines.

Semifinished

Semifinished Prices, Page 59

Due to the fact that some tin plate rollers are making up anticipatory tonnage there is a heavier demand for tin bars. However, little change is noted in billet, skelp or wire rod activity. Certain producers in the Pittsburgh district continue to build up ingot stocks. Carbon billets are $27, Pittsburgh; forging quality billets $32, and alloy billets $49. Sheet bars are $28, wire rods $38, and slabs and blooms $27.

Tin Plate

Tin Plate Prices, Page 58

Pittsburgh—Due to the fact that the tin plate buyers have little incentive to contract for 1935 requirements, the volume of business on their books for that period is disap-

pointingly light. Contracting in past years has always been brisk at this time, but the leading canmakers have not yet issued specifications for early 1935 shipment. Therefore, much of the present production in the rolling mills, which holds at 45 per cent, is anticipatory tonnage. The stock tin plate classification is definitely abolished, with the establishment of prices on wasters in sizes up to 12x14 inches maximum.

Pig Iron

Pig Iron Prices, Page 60

Pittsburgh—Melters continue to buy little more than carload pig iron requirements at a time. A number of foundries in the Pittsburgh district continue to be attracted by Fort Peck dam work. Steel mill roll shops in this district are doing slightly better but jobbing foundries are generally on poor schedules. Prices hold steady and unchanged on the basis of $18.50 per ton for foundry grades.

Cleveland—Further gains are noted in pig iron commitments, a lake furnace interest during the week booking 15,000 tons, compared with 9000 tons in the preceding week. Thirty per cent of last week's tonnage is for shipment this month. Foundries making automobile castings are leading in consumption, and demand from heating equipment manufacturers is holding up fairly well.

Interlake Iron Corp. has lighted stack B at Toledo, O., now operating both units there. National Tube Co., Lorain, O., has lighted another stack, now operating two of five units.

Chicago—Pig iron shipments are surprisingly heavy, deliveries so far this month for some sellers being 50 per cent ahead of the November rate and in the best volume since mid-year. A slackening during the holiday period is anticipated but consumers' interest in first quarter requirements indicates a prompt recovery in shipments during January. Farm implement manufacturers and makers of heating equipment continue to experience good operations, while requirements of automotive plants are expanding. First quarter contracting is moderately active, with the market continuing $18.50, furnace, for No. 2 foundry and malleable.

Boston—Small-lot pig iron shipments are slightly heavier while some consumers are covering for first quarter. Foundry melt is unchanged. Textile mill equipment plants have stocks to go through next quarter, one having ample foreign iron in storage.

New York—More interest is noted in the pig iron market, especially for first quarter. Until recently inquiries were for car lots only, but several were received last week ranging up to 400 tons each.

Washington—Bids will be taken Dec. 27 by the bureau of reclamation, interior department, at Denver, for 12 cast steel lower bulkhead gates for 325-foot head, and 12 cast steel upper bulkhead gates for 175-foot head, for installation in the intake towers at Boulder dam.

Philadelphia—With little change in the foundry melt and with consumers generally keeping stocks low prior to inventory, shipments of pig iron remain light. Producers look for an improvement in January, although admitting that buying probably will

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continue restricted for some time. Heavy consumption of foreign iron throughout the year on the eastern seaboard has cut into the bookings of domestic producers, with a result that only one merchant stack is now in operation along the seaboard, with none producing in this district since September.

Buffalo—A fair amount of December business has been placed with local producers of pig iron and more is in sight. Buying at this season is unusual and is believed to indicate a rather general shortage of stocks. Three furnaces are in production in this district, one of which is a merchant stack. Rush shipment of iron just before the close of navigation led to the belief that merchants had underestimated probable mid-winter sales.

Youngstown, O. — Youngstown Sheet & Tube Co. is preparing to relight a blast furnace and it may be in production this week. This will give it two active stacks here.

Cincinnati—Some improvement in pig iron demand over November is seen here, with most current business in small lots. Buying is keyed to immediate needs, and inventories are low. Prospects are bright for heavier shipments after the turn of the year. Prices remain unchanged and firm.

St. Louis—The melt of foundry iron in this district continues heavy, considering the time of year. Implement industries in the tri-cities district and Peoria, and the stove plants there and in the Belleville, Ill., district, are operating at a good rate. Some contracts, ranging from carloads up to 500 tons, are being made for the first quarter.

Birmingham, Ala.—Blast furnace interests continue meeting specifications in car lots and expect to see this demand hold for at least another 10 days. Favorable prospects for first quarter business are reported. Five furnaces are in operation, three on foundry and two on basic iron.

Toronto, Ont.—Pig iron sales are now running below the average for the past two months, but producers look for a strong revival early in the new year. Melters are showing little interest in the market and the majority desire to keep inventories as low as possible.

Scrap

Scrap Prices, Page 61

Pittsburgh—A Pittsburgh district mill last week paid $13.50 for a round lot of No. 1 heavy melting steel although several other melters were still content to stand by and watch the market level off. Readjustments have been made, finding No. 2 steel at a 50-cent advance to $11.50 to $12, based on sales, a 25-cent advance in machine shop turnings to a quotation of $8.75 to $9.25 and a strength apparent in railroad steel specialties.

Cleveland—Some steel and iron scrap is being moved from this market to the valleys and Pittsburgh district but holders are slow to sell their material at present prices. Melters seem likely to defer buying until after inventories have been completed.

Chicago—Scrap prices have advanced 25 cents to $1.50 a ton, with heavy melting steel up 75 cents, at $10.25 to $10.75. Spirited bidding by sellers continues, but available supplies have been curtailed by decision of several railroads to withhold scrap sales, and bids were rejected on several lists the past week. Scrap is coming out slowly and dealers see a scarcity of old material in prospect, if not already at hand.

Boston—Dealers are paying $6.50 to $6.75, f.o.b. cars, for No. 1 heavy melting steel for shipment to the Pittsburgh district, but only at points at a distance from Boston to offset transportation charges, $8.25, dock, being paid here for export. Buying for boat loading still leads in activity. Although New England steel works buyers are offering slightly higher bids, such prices are still too low to bring out much business against the export prices. Quotations are firm.

Advances were registered on eight grades of scrap during the week, the sharpest upturn being $1 a ton on scrap rails. On other grades increases were from 25 to 50 cents a ton.

New York—While brokers are buying heavy melting steel for export at unchanged prices, they are slow to take on additional foreign business in view of the strengthening domestic market. These grades are coming out in smaller volume. Prices are firmer but brokers on active grades are reluctant to establish higher buying prices in this territory.

Philadelphia—While scrap prices in this district appear to be reaching the peak of their present movement, a strong undertone continues. No. 1 steel is now holding at a flat price of $11, delivered, consuming point, and No. 2 steel at $9.50, with the minimum prices of $10.50 and $9, respectively, disappearing. The export market continues unchanged at $9.75, wharf, for No. 1 steel, and $8.75 for No. 2. Foreign buyers and domestic sellers appear deadlocked at the moment on first quarter tonnage, their price views being difficult to reconcile.

Baltimore—November ocean shipments of scrap through this port totaled 10,408 tons, according to a compilation here. All except 368 tons were consigned to Japan or China. In addition to scrap, 2687 tons of steel ingots and other metal

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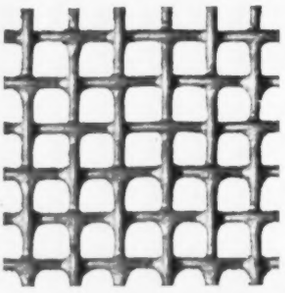

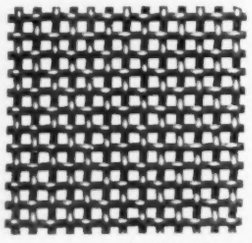

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products were shipped to Japan. Reports here are that Japanese interests have purchased nine ships on the Pacific coast, seven of which are to be scrapped and shipped to Japan in the two remaining boats.

Buffalo — Dealers are bidding against consumers for the limited supplies of scrap offered in this market. Higher prices outside have diverted most tonnage that would have moved here recently. Both groups offer about $8.75 for No. 2 heavy melting steel, the principal grade wanted.

Detroit — Heavy melting steel, compressed sheets and several other grades have advanced $1 a ton as a result of active bidding during the past week. Heavy melting steel now is $9 to $9.50, with compressed sheets $9.25 to $9.75. Prices have acquired considerable strength as a result of higher quotations in other districts, with new business from local consumers relatively light. Scrap production at automotive plants is increasing gradually.

Cincinnati—Mills in this district were not tempted into buying on the rising market for iron and steel scrap, and although price increases are holding, there is a belief in some quarters that the prices are softer. In absence of mill buying the rise in quotations was attributed to dealers' activities, influenced by the strength of nearby demand.

St. Louis—The steel and iron scrap market continues strong, with prices of some items higher.

Stocks are said to be low, with export trade drawing offerings that ordinarily would be absorbed in the St. Louis industrial district and other centers showing increased activity.

Approximately 3000 tons of heavy melting steel was purchased by an East Side mill at 25 cents a ton above the price prevailing the preceding week.

Birmingham, Ala.—Despite activity in other directions the iron and steel scrap trade shows no improvement. Dealers report all purchasing is in small lots with specification for early delivery. Few or no sales are being made for first quarter.

Seattle—Large tonnages are being shipped this month from North Pacific ports to Japan. Local melters are buying sparingly and foundry consumption is low.

Toronto, Ont.—Trading in iron and steel scrap is without feature. The recent improvement in demand has disappeared and only a few special grades now are moving. Dealers in turn are out of the market and are holding prices unchanged.

Warehouse

Warehouse Prices, Page 62

Pittsburgh—Jobbers continue to move only occasional small lots of steel with total shipments practically unchanged from the same two weeks of November. Application of small-lot quantity extras on plates and structural shapes are not expected to be of benefit to jobbers until after Jan. 1. All warehouse steel prices are holding unchanged.

Cleveland—Business has improved slightly, warehouse orders and tonnage now exceeding that of the comparable number of days in November by a slight margin. Prices are steady.

Cincinnati—Sales of steel from warehouse are without feature, showing only slight decline in industrial needs.

Chicago—While some decrease in

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sales is noted, it is less than usually experienced in December. A further decline is anticipated the last two weeks of the month.

Detroit — Sales still compare favorably with the November rate and are expected to maintain the recent volume, except during the holiday period.

Seattle—Prices of steel from warehouse are firm. Volume is normal for the season. Public works call for considerable tonnage but private buying is inactive, consisting of small lots for immediate delivery.

Nonferrous Metals

Nonferrous Metal Prices, Page 60, 61

New York—An advance of $2 a ton in pig lead was outstanding last week in an otherwise steady nonferrous market. Copper sales were fair with prices steady on the basis of 9.00c, Connecticut, for electrolytic. Zinc was firmer.

Copper—Sales for the week were fair bringing the total for the month to date over 9000 tons, or more than enough to maintain the marketing provisions of the code. Sentiment in the trade was optimistic in view of increased sales and developments leading toward a world conference on production and marketing.

Lead—Lead sales were moderately active with the bulk of the buying for January delivery since consumers apparently are well covered on requirements for the balance of December. American Smelting & Refining advanced its price for pig lead to 3.60c, New York, and 3.45c, E. St. Louis.

Zinc—Undertone of prime western market appeared firmer with a number of sellers asking prices higher than the going market level throughout most of the week. Metal was available, however, at 3.70c, East St. Louis. Talk of likely curtailment of production by prime western producers has brightened the outlook for the industry.

Tin—Straits prices moved fractionally from day to day in a generally quiet market. Fluctuations were due largely to sterling exchange movements.

Antimony—Prices were nominal and did not receive any adequate test. Spot was quoted unchanged at 13.75c to 14.00c, duty paid.

Metallurgical Coke

Coke Prices, Page 59

By-product coke shipments for domestic use have not picked up correspondingly with recent cold weather owing to accumulations built up through late October and November.

Metallurgical grades of beehive coke are without change in prices on specifications for shipment at least over the balance of December. Common foundry grades are $4.60 per ton, Connellsville, Pa., ovens; premium foundry grades $5.10 to $5.35 per ton; and standard furnace coke $3.85 per ton, same basis. There are practically no coke contracts in the market.

Foundries at Chicago have increased their December tonnages and shipments this month are above the November rate. Prices are steady. Cincinnati foundries on automotive work show an increased consumption.

Iron Ore

Iron Ore Prices, Page 60

Cleveland—Receipts of Lake Superior iron ore at Lake Erie docks in November totaled 420,900 tons, and shipments from the ports to interior furnaces 301,169 tons, as reported by the Lake Superior Iron Ore association. Receipts and shipments for the season to Dec. 1, and dock balances follow:

	Receipts	Shipments	Dock bal. Dec. 1,'34
Buffalo	1,630,319	7,789	2,962
Erie	902,533	916,820	117,173
Conneaut	3,294,610	3,273,540	1,882,621
Ashtabula	1,742,708	1,640,746	1,605,178
Fairport	678,722	683,905	387,403
Cleveland	4,035,905	2,649,223	857,398
Lorain	2,106,963	1,165,259	12,527
Huron	396,321	365,531	369,043
Toledo	784,442	395,955	14,250
Total	15,572,523	11,098,768	5,248,555
Year ago	16,323,050	11,910,587	5,405,691

Receipts for the season at other lake ports:

	Tons
Detroit	790,709
Indiana Harbor	1,341,838
Gary	1,599,068
South Chicago	2,173,931
Sault Ste. Marie, Ont.	120,984
Hamilton, Ont.	420,554
Total	6,447,084
Year ago	5,084,644

Coke By-Products

Coke By-Product Prices, Page 59

New York—Distributors are covering distillate consumers for next year at the following unchanged prices per gallon, producers' plants in tank lots: benzol, 19.00c; toluol, 30.00c; solvent naphtha, 26.00c; and xylol, 26.00c. Coke oven by-products are seasonally slower, although contracting for first quarter is normal.

Ferroalloys

Ferroalloy Prices, Page 60

Sellers of ferromanganese and spiegeleisen are lining up contracts for next year, meanwhile shipping against moderate releases on present contracts. Ferromanganese is

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Steel in Europe

Foreign Steel Prices, Page 62

London—(*By Radio*)—Production of steel ingots and castings in Great Britain in November was 766,000 gross tons, compared with 812,000 tons in October, a decline of 46,000 tons. The daily average for November was 29,461 tons; in October 30,074 tons. The smaller tonnage is almost accounted for by the shorter month in November.

Pig iron production in November was 527,100 tons, 19,500 tons under October, a daily average of 16,920 tons. In October it was 527,100 tons, a daily average of 17,003 tons. Stacks in blast at the close of November numbered 96, one less than Oct. 31.

Business in steel is quieter, due to seasonal influences, but works are well booked for shipment next year. Inroads of continental steel are relatively unimportant. Foreign sales of pig iron to the Continent and the Argentine are increasing. Tin plate demand is fair and galvanized sheets are improving. The Continent reports export business is dull. Poland has booked a steel rail contract for Persia.

Dawes Sees Big Spring Recovery

(*Concluded from Page* 13)

mass demand commences to test productive capacity.

On the other hand, the run-down condition of many now existing steel and iron plants, due to the comparatively low production of the last few years, especially in the smaller plants, as compared with their tuned-up condition in 1929, may have tended to reduce the ratio of potential productive capacity to potential demand in this depression, as compared with the two former depressions.

On balance, as far as forecasting the time of recovery is concerned, I have considered these factors as offsetting each other.

The striking point in the chart of pig iron prices may superficially seem remarkable, but as a matter of fact it is due chiefly to the uniformity of mass action under the laws of human nature. The particular time when the sustained postponed mass demand for durable goods in the 1873 and 1893 depressions began to test the productive capacity of the country, marking in each instance the arrival of the final post-depression year of full business recovery, was reached in each instance as shown by the chart in a period of about five years and six months after the respective initial stock market collapses. (See chart on page 13.)

Accordingly, I suggest that not later than June or July of next year, (1935) should be the beginning of the great sustained demand for durable goods due to the accumulation for five years of postponed demands and this time should also mark the commencement of the year of full business prosperity in the country.

That I may not seem unduly rash in entering the arena of definite prophesy, I may say that the steel and iron men five and one-half years after the commencement of the 1893 depression when bessemer pig iron was selling for about $11 per ton maintained without hesitation that the productive capacity of the steel and iron industry in the country was so great that there could be no increase in demand which the industry could not meet and there would be no material increase in prices. But what happened a month or six weeks later was a rapid rise in eleven months of the price of pig iron from $11 to $25 per ton. . . . .

The mistake that the steel and iron manufacturers made then (in 1899) and the mistake which many forecasts make today is the same— an underestimate of the enormity of the aggregate demand of the small purchasers of the United States when a mass movement is involved and the satisfaction of the pent-up demand of five years for durable goods starts in full blast.

Equipment

Boston—Contracts for more than $150,000 worth of equipment for government arsenals and field stations have been awarded New England machine tool builders with a good part of the volume, on which bids are in, still unplaced. Work schedules in numerous plants, including several in the Worcester, Mass., and Providence, R. I., districts have been advanced. There has also been a gain in inquiry and buying by private industrial plants, although such purchases are for one or two tools at a time.

Chicago—Machinery and equipment sales, although in relatively small volume, show surprising vitality for this period. Demand for

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machine tools and miscellaneous small metalworking equipment has been well maintained so far in December following a moderate increase in November. The month as a whole is expected to show some decrease since demand ordinarily is light during the Christmas week. Most purchases of machine tools call for prompt delivery since users are placing orders generally of necessity. Inquiries are in fair volume and point to some recovery in general equipment demand next quarter. Disposition of machine tools for the federal arsenal has yet to be announced, bids recently being under consideration at Washington. A few inquiries for machine tools have been reissued by the navy. Practically no inquiries for new equipment have been issued by railroads recently, with orders calling almost entirely for repair parts. Small tool demand is fairly steady.

Pittsburgh—Detailed summary of recent developments in the Pittsburgh steel mill equipment market will be found this week in STEEL, p. 14.

New York—Machine tool buying for federal government shops, mostly arsenals, is active, but little new inquiry for industrial plant equipment is recorded. Dealers are figuring a fair volume of such work, but actual purchasing is not expected until after the first of the year.

Portland, Oreg.—Maj. Charles F. Williams, U. S. engineer, has announced bids will be called within six months for $11,000,000 of work in connection with the $32,450,000 Bonneville dam project. It is expected to issue a call this month for powerhouse turbines, two main units and one house set, estimated at $1,500,000. In March there will be a call for two main generators and one house unit, to cost $1,600,000. In April bids will be asked for 750,000 barrels of cement, the main transfers and portion of the switchgear, to cost $365,000, also channel improvements and relocation of railroad tracks, estimated at $1,700,000. Probably in May bids will be requested for canal excavation, $330,000; lock gates, tainter valves, etc, $390,000; crest gates, gantry cranes for spill-way dam, draft tubes, gantry cranes and intake gates for powerhouse, figured at $1,500,000.

Construction and Enterprise

New England

SOMERSET, MASS.—Crowninshield Shipbuilding Co. plant and docks were damaged by fire last week.

TOGUS, ME.—Construction service, veterans' administration, Washington, will ask bids Jan. 3 for buildings and utilities for institution here, including ice making and refrigeration plant, outside electrical distribution system, motors and controls, electric elevators, power equipment, etc. Estimated cost of entire project $1,000,000.

New York

ALBANY, N. Y.—A. P. W. Paper Co. plans installation of motors, controls and other electric power equipment as well as mechanical handling apparatus in its new multi-story paper converting plant. Estimated cost $400,000.

NEW YORK—Newman Sheet Metal Works Inc. has been organized to deal in sheet metal, by Benjamin Abrams, 191 Joralemon street, Brooklyn, N. Y.

Pennsylvania

AMBRIDGE, PA.—Spang, Chalfant & Co. Inc., 2300 Clark building, Pittsburgh, is building a 60 x 240-foot addition to its south mill building at its seamless plant here, which will permit straight line operations through its threading and coupling departments.

CORRY, PA.—Dallas E. Dindslow Inc., care of M. R. Olds, Corry, Pa., has purchased plant of Climax Mfg. Co. which it will rehabilitate and install new equipment for manufacture of logging locomotives and parts.

Ohio

LEETONIA, O.—Leetonia Tool Co., C. E. Holt manager, is making extensive improvements to its plant, made necessary by steadily increasing business. A new steel building, housing a modern shipping room and warehouse, is now being constructed. The present shipping room and warehouse will be converted into a power plant where electricity will be generated to supply light, heat and power for entire plant.

SIDNEY, O.—John Wagner Sons Brewing Co. is planning to recondition its brewery at a cost of about $75,000

TROY, O.—Gummed Products Co. is planning installation of motors and controls, conveyors, etc., in its new addition to paper products plant, including improvements in present factory. Estimated cost $200,000. John H. Deeken, Times-Star building, Cincinnati, architect.

Michigan

DETROIT—Allied Distillers Corp. has been formed to operate a distillery, by Louis Lasky, 13300 Joseph Campau avenue.

DETROIT—Allied Products Co., 4646 Lawton street, has purchased the plant of the Electro Products Co., Hillsdale, Mich., and it is expected the company will make extensive changes in the interior of the building.

LANSING, MICH. — North Side Commercial club and Merchants association are planning the establishment of a canning factory, either through the erection of a new building or alterations to an existing factory.

SAGINAW, MICH.—Saginaw Malleable Iron Works is planning to erect a factory addition.

Illinois

CHICAGO—Samuel M. Olson Mfg. Co. Inc., 19 South LaSalle street, has been formed to deal in machines, parts of machines, conveyors, tools, fixtures, sheet metal and structural steel works, by Samuel Olson, Peter Olson and Joseph J. Berzin. Correspondent: Joseph J. Berzin, 19 South LaSalle street.

CHICAGO — Triangle Motor Rebuilders Inc., 4735 West Lake street, has been incorporated by Edward J. Walther, Philip H. Gluevar and G. Walter Arny, to operate a general machine shop, build and rebuild motors and other machinery, and manufacture machine made articles. Correspondent: Frank L. Delay, 547 West Lake street.

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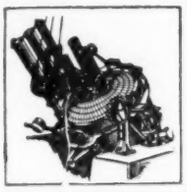

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CURTIS COMPRESSORS—AIR HOISTS—I-BEAM CRANES and TROLLEYS

Shovel Co. recently suffered damages by fire to its boiler room, engine room and shear room.

LADD, ILL.—Village is having plans prepared and will take bids early in 1935 for sewage disposal plant to cost about $47,000. PWA project.

Alabama

BIRMINGHAM, ALA.—Pepsi Cola Co., Fortieth avenue and Ninth street, Long Island City, N. Y., is planning to lease or acquire a bottling plant and will alter and recondition same, at an estimated cost of $28,000.

FAYETTE, ALA.—W. P. Brown & Sons recently sustained damages by fire to their machine shop. Shop will be rebuilt.

District of Columbia

WASHINGTON—Quartermaster depot, Twentieth and C streets, northwest, will take bids Dec. 26, circular 75, for 50 5-kilowatt gasoline-electric generator sets.

WASHINGTON — Bureau of supplies and accounts, navy department, will open bids Dec. 21, schedule 3923, on vacuum and centrifugal pumps, for delivery at White Plains, Md.

Florida

HIALEAH, FLA.—C. E. Barr and associates, Hialeah, Fla., have acquired the Hialeah brewery and equipment, and are planning to expend $60,000 for completion of plant.

Kentucky

BURKESVILLE, KY. — Cumberland Co. has made application to state public service commission for permission to construct a municipal power plant.

FORT THOMAS, KY. — Cincinnati, Newport & Covington Railway Co., Covington, Ky., is planning to construct a power substation here, costing about $30,000.

Maryland

MOUNT AIRY, MD.—Town council and mayor has appointed a committee to study the practicability of establishing a municipal light plant.

Mississippi

JACKSON, MISS.—City plans voting on $1,000,000 revenue bond issue for constructing municipal plant and distributing system, using TVA power.

PELAHATCHIE, MISS. — Sawmill and power house of Pearl River Valley Lumber Co. recently suffered damage by fire.

Virginia

GLASGOW, VA.—Blue Ridge Co. Inc., recently organized with capital of $1,000,000, care of Ballinger Co., 105 South Twelfth street, Philadelphia, architect and engineer, will soon begin construction of initial units of new woolen and carpet mill, including power house. Installation will include motors and controls, transformers, conveyors, etc. Estimated cost $200,000.

Missouri

KANSAS CITY, MO.—Liquid Carbonic Co., 3100 South Kedzie avenue, Chicago, plans installation of motors and controls, compressors and conveyors in its new multi-story dry ice manufacturing plant here, to cost over $250,000.

MILLER, MO.—City will open bids Dec. 21 for waterworks, including 50,000-gallon steel elevated tank. Ozark Engineering Co., engineer, Springfield, Mo.

ST. JOSEPH, MO. — Wireless Power Transmission Corp. of Missouri has been incorporated with $100,000 capital, by Bertram Marks and Lee Brown.

ST. LOUIS—Remington-Rand Inc., 205 East Forty-second street, New York, has acquired the United Accounting Machine Co., St. Louis.

Arkansas

FORT SMITH, ARK.—Ozark Distillers Co., A. S. Bullock, is completing plans for $80,000 winery and distillery, for occupancy in July, 1935.

Texas

PARIS, TEX. — City, M. J. Crook, mayor, has loan and grant of $98,000 for improvement to sewage disposal plant and addition to collecting system. Hawley, Freese & Nichols, engineers, Capps building, Fort Worth, Tex.

STREETMAN, TEX.—City, R. C. Cole, mayor, will receive bids Jan. 3 for waterworks system. Work includes 50,000-gallon elevated tank, pump station, distribution system and pressure filters. H. R. F. Helland, engineer, Frost National Bank building, San Antonio, Tex.

WOODSBORO, TEX. — Edward Fricke, mayor, will take bids Dec. 28 for constructing and installing waterworks supply and distribution system, including elevated tank and tower, pump building and pump equipment.

Wisconsin

BELOIT, WIS.—Fairbanks, Morse & Co., 900 South Wabash avenue, Chicago, is planning to expend about $100,000 for remodeling and modernizing its plant here.

DELAVAN, WIS.—Sta-Rite Products Co., a new organization for manufacture of electric pumping units, has plans by Herbert J. Grassold, 759 North Milwaukee street, Milwaukee, for first unit of new plant, 40 x 80 feet.

MILWAUKEE — Modern Pattern Co. has awarded contract for rebuilding factory after fire damage.

MILWAUKEE—Miller Brewing Co., 4000 West State street, has awarded contract for construction of a new boiler house and will install additional power plant equipment.

MILWAUKEE—Pasco Trucking Co., 1262 West Canal street, has let general contract to W. W. Oeflein Inc., 210 East Wisconsin avenue, for building new fireproof garage and service building, 70 x 100 feet.

MILWAUKEE—Work is under way on a 1-story machine shop addition, 60 x 125 feet, for Louis Allis Co., manufacturer of electric motors, at 427 East Stewart street. With equipment cost will be about $30,000.

MILWAUKEE—Shallcross Controls Inc., 3707 North Richards street, manufacturer of mechanical devices, including electrically-operated gas pressure regulators and governors, electric sash and shade operating devices, and high tension switch mechanisms, has been incorporated by W. M. Shallcross, Alfred Morawetz and Caroline Goodman.

STRATFORD, WIS.—City is having plans prepared for a water supply system to include 4000 lineal feet of 6-inch pipe, deep well, deep well turbine pump and filtration gallery 600 feet long. W. G. Kirchoffer, 22 North Carroll street, Madison, Wis., is engineer.

Minnesota

MOORHEAD, MINN.—Clay county, John C. Atkinson auditor, will build a 1-story machine shop and storage shed, 40 x 80 feet.

Nebraska

BEATRICE, NEBR.—Southeast Nebraska Power district, J. Edward Fisher, Beatrice, Nebr., secretary, will soon take bids for an electrical distribution system for light and power service. Fund of $575,000 has been secured through federal aid.

OMAHA, NEBR.—Omaha Packing Co., Isadore Raznick president, has awarded contract for construction of a 2-story packing plant addition, 27 x 50 feet, to increase capacity of cooler and killing plant.

SUTHERLAND, NEBR. — Platte Valley Public Power & Irrigation District, Gerald Gentlemen secretary, North Platte, Nebr., will receive bids until Dec. 19 for 2 vertical shaft waterwheel driven generators furnished with automatic voltage regulators to be used in connection with the $7,500,000 Sutherland irrigation and power project now under construction.

Montana

GREAT FALLS, MONT.—Riverside Machine Works has awarded contract for construction of a 1-story, 50 x 75-foot addition to its machine shop on Second avenue, South. McIver & Cohagen, Strain building, Great Falls, Mont., architects.

Pacific Coast

SOUTH SAN FRANCISCO—City is making a survey for complete unit diesel electric power plant. Estimated cost $350,000.

ALBANY, OREG.—Mountain States Power Co. will arrange fund of about $403,500 for extensions and improvements in 1935, including power plants, power substations, transmission and distributing system.

MEDFORD, OREG. — California-Oregon Power Co. is arranging fund of $493,386 for extensions and improvements in power plants in 1935, including transmission and distributing lines, power substations and equipment, and replacements.

LONGVIEW, WASH. — Longview Fibre Co. is erecting a concrete warehouse, adding 15,000 square feet to handle converting operations for repulped trim. New machinery will be installed.

SELAH, WASH. — Yakima Valley Brewing Co. has been incorporated with $157,000 capital, by James Sells and Associates.